

# Parallel Exchange Rates in Developing Countries

## Lessons from Eight Case Studies

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Although a case can be made for using a dual exchange rate system as a temporary option for dealing with a balance of payments crisis, experience shows that it does not work well in practice. Often it is used as a way to postpone the necessary macroeconomic adjustment instead of reducing its costs.



## Summary findings

In parallel (dual) foreign-exchange markets — extremely common in developing countries — a market-determined exchange rate coexists with one or more pegged exchange rates.

Kiguel and O'Connell report the main lessons from a World Bank research project on how these systems work, based mainly on case studies in Argentina, Ghana, Mexico, Sudan, Tanzania, Turkey, Venezuela, and Zambia.

On the whole, the experiences were disappointing. Most countries tolerated high premiums for long periods, which harmed the allocation of resources and growth. The studies indicate no clear gains from prolonging a dual system.

The case for a dual foreign exchange system is stronger when the system is adopted as a temporary option to deal with a severe balance of payments crisis. Argentina, Mexico, and Venezuela resorted to a dual system at the time of the debt crisis, to smooth out the devaluation in the exchange rate to achieve the needed real depreciation. This helped to maintain limited control over domestic inflation, and avoided a sharp drop in real wages while protecting the balance of payments. In the longer term, not much was gained.

In the cases studied, the dual system was misused more often than not: it was used too long and the premium was higher than it should have been. Venezuela, for example, used the system for six years with an average 120 percent premium, Mexico for five years (average 30 percent), and Argentina for eight years (average 44 percent). In Argentina and Venezuela, the dual system was used to avoid macroeconomic adjustment while protecting international reserves. It is doubtful the

macroeconomic gains (in terms of keeping equilibrium in the balance of payments and lower inflation) were greater than the costs in terms of misallocation of resources.

In Ghana and Tanzania, the dual exchange rate system was prolonged to maintain overvalued real exchange rates and expansionary macroeconomic policies. The large premium in those countries (at times more than 1,000 percent) shows the dramatic inconsistency between exchange rate policy and monetary and fiscal policies.

On determinants of the parallel exchange rate, the evidence indicates that macroeconomic fundamentals (such as fiscal deficit, credit policies, and so on) matter most. In the short run the premium is driven by expectations about the evolution of these macroeconomic factors.

Overall, in the countries examined in the project, the existence of a parallel foreign exchange market generated fiscal losses. These losses resulted because the public sector was a net seller of foreign exchange at the official exchange rate. This means that unification has some pleasant fiscal arithmetic.

The experience with unification indicates that it usually takes place at the parallel exchange rate. Most countries unified to a crawling peg system, though some opted for floating exchange rates. Successful unification to a fixed exchange rate was less frequent, and it required strong adjustment in fiscal and monetary policies. Regarding speed, unification was quick in countries where the parallel system was used temporarily, and gradual in those where the system existed for long periods and with a tradition of widespread foreign exchange controls.

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# **PARALLEL EXCHANGE RATES IN DEVELOPING COUNTRIES**

## **Lessons from Eight Case Studies**

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## 1. Introduction

Parallel foreign exchange markets—which are extremely common in developing countries— are those in which a market-determined exchange rate coexists with one or more pegged exchange rates. Although there is an extensive theoretical literature on the macroeconomic implications of parallel foreign exchange markets, evidence on how these systems work in practice is limited.<sup>1</sup> This paper reports the main lessons from a World Bank research project aimed at filling this gap.<sup>2</sup>

The core of the project is a set of case studies of parallel foreign exchange rate market episodes in Argentina, Ghana, Mexico, Sudan, Tanzania, Turkey, Venezuela, and Zambia. These countries span a wide range of development levels, degrees of sophistication of financial markets, and degrees of legality of parallel markets. The case studies are supplemented by a pair of cross-country studies of parallel market experience in developed and developing countries. Taken together, the papers in the project provide an important body of evidence on the macroeconomic characteristics of parallel foreign exchange systems.

There is great variety in experiences with multiple exchange rate systems (as discussed in section 2). Some countries adopted a parallel foreign exchange market on a temporary basis to deal with balance of payments of crisis (mainly in Latin America) while in others the parallel market is more permanent and developed in response to widespread foreign exchange controls (especially in Africa). There are also differences regarding the spread (as shown in table 1). Based on data for 38 countries we find that there is wide dispersion in the size of average the premium for the period 1970-90, ranging from low levels (less than 10%) in most Asian countries and in the few industrialized countries that adopted the system, to very large (exceeding 50%) in many African and Latin

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<sup>1</sup> Lizondo (1990) provides a survey of the theoretical literature.

<sup>2</sup> The study is "The macroeconomic implication of multiple exchange rate systems," RPO 675-30.

**TABLE 1**  
**BLACK MARKET PREMIUM**  
(MEDIAN)

COUNTRY      1960-61      1962-63      1963-64      1964-65

**LOW PREMIUM**

|               |      |      |      |       |
|---------------|------|------|------|-------|
| Thailand      | -0.4 | -0.2 | -1.5 | 5.1   |
| Malaysia      | 0.6  | 0.3  | 0.6  | 8.2   |
| Venezuela     | 1.1  | 0.4  | 75.2 | 213.0 |
| Belgium       | 1.1  | 1.0  | 1.3  | 9.9   |
| France        | 1.9  | 0.7  | 2.8  | 12.6  |
| Italy         | 2.3  | 2.8  | 1.4  | 13.4  |
| Indonesia     | 2.7  | 2.2  | 3.4  | 15.5  |
| Mexico        | 3.5  | 0.0  | 17.7 | 66.0  |
| Uruguay       | 4.8  | 4.4  | 7.1  | 73.0  |
| South Africa  | 5.1  | 5.8  | 4.4  | 33.7  |
| Morocco       | 5.2  | 4.6  | 5.8  | 17.0  |
| Philippines   | 6.6  | 7.7  | 4.9  | 50.0  |
| Korea(South)  | 6.7  | 11.0 | 6.1  | 23.5  |
| Turkey        | 8.9  | 9.1  | 8.4  | 52.8  |
| Colombia      | 9.0  | 4.4  | 12.7 | 28.3  |
| Israel        | 9.7  | 26.5 | 5.8  | 70.0  |
| <i>Median</i> | 3.2  | 2.4  | 3.7  |       |

**MODERATE PREMIUM**

|                 |      |      |       |        |
|-----------------|------|------|-------|--------|
| Bolivia         | 10.1 | 5.5  | 17.6  | 293.1  |
| Ecuador         | 12.1 | 8.0  | 34.2  | 96.1   |
| India           | 13.8 | 17.4 | 13.1  | 93.7   |
| Kenya           | 15.3 | 16.8 | 15.2  | 44.9   |
| Chile           | 15.6 | 8.3  | 18.5  | 1260.0 |
| Pakistan        | 23.0 | 26.9 | 14.8  | 211.9  |
| Brazil          | 25.6 | 11.1 | 43.1  | 173.0  |
| Syria           | 27.1 | 5.7  | 213.4 | 1046.5 |
| Domin. Republic | 29.0 | 26.5 | 36.0  | 213.0  |
| Sri Lanka       | 36.6 | 73.8 | 15.2  | 237.4  |
| Argentina       | 43.3 | 55.8 | 43.3  | 363.0  |
| Malawi          | 45.0 | 51.7 | 41.4  | 108.0  |
| <i>Median</i>   | 21.3 | 18.2 | 24.6  |        |

**LARGE PREMIUM**

|               |       |       |       |        |
|---------------|-------|-------|-------|--------|
| Peru          | 50.2  | 51.2  | 27.0  | 278.9  |
| Nigeria       | 59.2  | 37.8  | 85.5  | 456.6  |
| Zaire         | 62.5  | 106.0 | 13.6  | 295.1  |
| Ethiopia      | 65.5  | 41.1  | 103.9 | 226    |
| Zambia        | 68.7  | 102.5 | 40.8  | 361.9  |
| Sudan         | 84.6  | 85.4  | 78.8  | 344.4  |
| Egypt         | 84.6  | 80.0  | 106.1 | 248.4  |
| Ghana         | 120.9 | 66.3  | 142.0 | 4263.7 |
| Tanzania      | 127.2 | 95.5  | 214.3 | 301.4  |
| Algeria       | 189.6 | 59.5  | 332.5 | 418.6  |
| <i>Median</i> | 80.4  | 73.5  | 100.0 |        |

American countries. It is also clear that the premium increased in the 1980s relative to the 1970s, as countries intensified foreign exchange controls to deal with larger macroeconomic imbalances and more severe balance of payments problems. Finally, even countries that have low or moderate premiums had at one time or another episodes of high premium. This indicates that it is not unusual to use the parallel exchange rate as a safety valve at times of balance of payments crisis. Nevertheless, there are a few episodes (e.g. Ghana 1980-86, Tanzania times, Chile 70-73, etc.) when extremely high premiums were maintained for long periods (over three years).

The paper concentrates on three issues: (i) the reasons for the adoption or emergence of parallel foreign exchange markets, (ii) the functioning of parallel foreign exchange market; especially the two way relationship between the impact of macroeconomic policies on the parallel premium, and the impact of changes in the premium on macroeconomic performance, and (iii) issues related to the unification of foreign exchange markets.

We examine adoption in section 3, where we identify two distinct patterns: in one, countries start with unified foreign exchange markets and then a parallel market is created in response to a balance of payments crisis. The episodes of Argentina in 1981 and again in 1982, Mexico in 1982 and Venezuela in 1983 fit this pattern. The objective in these cases is to rely on the parallel foreign exchange market to avoid the undesired effects of the overshooting of a unified exchange rate on domestic prices, while maintaining limited control over international reserves. In the second case, the parallel foreign exchange market develops gradually in response to widespread restrictions to operate in the official market. Most African countries without convertible currencies display this pattern. The premium generally rises in these economies as controls are tightened at times when countries have balance of payments problems. In countries with protracted external imbalances, large premiums can last for a long time (as was the case in Algeria, Ghana, etc.).

In section 4 we discuss the functioning of parallel foreign exchange markets. We first examine the determinants of the parallel exchange rate and the premium. The analytical framework is a model

where the premium is jointly determined by asset market conditions and the parallel current account (the stock flow-model). The results, based on the case studies, broadly support the stock-flow model. The premium increases as a result of a real appreciation, a rise in real money balances or in the budget deficit, or of a reduction in the uncovered differential between domestic and foreign interest rates. We then examine the impact of a parallel foreign exchange market on macroeconomic variables. The evidence from the case studies indicates that unless the adoption of parallel foreign markets is accompanied by severe foreign exchange controls they fail to insulate international reserves from capital flows. In most of the countries in our sample, parallel foreign exchange markets inflicted fiscal losses, in some cases as large as 10 percent of GDP. In addition, the case studies show that parallel foreign exchange markets are not an effective instrument to maintain low inflation in the longer term.

We look at unification in section 5, and find that there is great diversity on the speed, and the exchange rate system adopted. Experience shows that unification often takes place rapidly at times of macroeconomic crisis, as multiple exchange rates cease to be useful in protecting international reserves. This was certainly the case in Argentina (in 1989) and in Venezuela. There are also cases of successful gradual unification, especially in African countries where it usually moved in tandem with price deregulation and trade liberalization. Ghana and Tanzania followed this approach quite successfully.

The key for successful unification is to choose an exchange rate regime that is consistent with the underlying fiscal and monetary policies. Countries that maintain money financed budget deficits cannot succeed in unifying into a fixed exchange rate, as inflation would quickly lead to an overvalued real exchange rate. Whether countries unify to a flexible exchange rate system, or a crawling peg is of secondary importance.

In section 6, we provide evidence indicating that parallel foreign exchange markets do provide limited insulation on the balance of payments and on domestic prices in the short term, but are ineffective in the longer term. Section 7 provides estimates of the fiscal effects of exchange rate



unification for a subset of the case study countries, and shows that in most cases it resulted in fiscal losses (as large as 10 percent of GDP). We conclude in section 8 with some policy lessons from the project.

## **2. Varieties of Parallel Market**

At the heart of any parallel foreign exchange market is a set of government restrictions assigning certain transactions to the pegged or managed exchange rate and others (perhaps implicitly) to the parallel rate. The details of exchange restrictions vary widely from country to country. For most macroeconomic purposes, however, the array of parallel systems observed in developing countries can be reduced to a simple classification according to the coverage and legality of the parallel rate (Table 2).

The most fundamental distinction is with respect to coverage. Virtually all systems assign capital outflows, and usually inflows as well, to the parallel rate. Where systems differ is in the assignment of current transactions. We therefore distinguish in Table 2 between systems in which the free rate applies mainly to the capital account and those in which it also applies to a broad range of current transactions. We omit the case in which exchange controls apply solely to current transactions, since this case is not observed in practice.

A secondary distinction is with respect to the legality of transactions at the parallel rate. At the formal level, such transactions are either legal or illegal. Given the high costs of enforcement, however, governments typically tolerate a substantial amount of illegal parallel market activity. It is not unusual to observe attempts to suppress parallel markets, but success in such efforts -- and the commitment to continue them--is typically short-lived. We therefore distinguish between systems in which transactions at the parallel rate are either legal or illegal but largely tolerated and those in which a substantial threat of enforcement is present most of the time.

**Table 2 Classification of Case Study Episodes, 1970-1990**

|   |                     | Coverage of Parallel Rate   |   |
|---|---------------------|---|---|
| Legality of Transactions at the Parallel Rate |                     | <u>Mainly Capital Account</u>   | <u>Capital Account and Some Current Account</u>   |
|   | Legal/<br>Tolerated | Europe (*)<br>Mexico ('82-'88)<br>Argentina ('81-'89)<br>Turkey ('80-'84)<br>Ghana (after 1987) | Venezuela ('83-'89)<br>Tanzania (after 1984)<br>Ghana ('83-'87)<br>Zambia ('87-'88)           |
|   | Illegal             |   | Ghana (before '83)<br>Sudan<br>Tanzania (to '84)<br>Turkey (1970s)<br>Zambia (except '87-'88) |

\* Includes dual exchange rate experiences in Belgium (1957-90), France (1971-74) and Italy (1973-74).

Table 2 emphasizes that macroeconomically important parallel markets do not emerge in the absence of exchange restrictions on transactions for investment and portfolio purposes. Given the ease with which foreign exchange acquired through the capital account can be converted into trade finance, exchange controls on current transactions would be virtually unenforceable in the absence of convertibility restrictions on the capital account. And while direct taxes and quantitative restrictions on trade help determine the level of the premium in a parallel system, both theory and the available evidence--from Indonesia, Uruguay, and the CFA countries in Africa, all with open capital accounts--suggest that in the absence of capital controls the parallel market remains thin and the premium small even in the presence of substantial tariffs, quantitative restrictions and illegal trade.

In practice, coverage and legality are matters of degree rather than discrete categories. This leads to two difficulties in the classification of case study episodes. First, parallel systems can and do evolve over time, moving gradually from one category to another as the degree of coverage and/or legality changes. Second, and more importantly, the categories are broad enough that macroeconomically important sub-episodes--such as the crackdown on illegal activity in Tanzania in 1983--may not show up as a qualitative shift in the table. With these caveats in mind, Table 2 gives a rough classification of parallel market episodes in the case study countries over the period from 1970 to 1990.

Beginning with the upper left quadrant, the European experiences with dual exchange rates involved legal parallel rates applying mainly to the capital account. Argentina (1981-89) and Mexico (1982-88) represent extended episodes of narrow coverage and effective legality; in the case of Argentina, the parallel rate was initially a legal dual rate (1981 and 1982) but became an illegal (but tolerated) rate on re-imposition of exchange controls. Venezuela (1983-1989) represents a legal dual system buttressed by severe foreign exchange rationing for imports. Auction-based parallel markets in Ghana (1986-87) and Zambia (1987-88) also involved a legal free rate that applied to a broad range of current transactions. The black-market systems that operated in the 1970s in Ghana, Sudan, Tanzania,

Turkey and Zambia were accompanied by extensive foreign exchange rationing on the current account; the table shows the transitions experienced by some of these countries as they implemented macroeconomic reforms and moved towards convertibility on the current account (and for Turkey, on the capital account as well).

### **3. Adoption or Emergence of Parallel Foreign Exchange Markets**

There are essentially two ways in which parallel foreign exchange markets develop and become important in the economy (i.e. the premium and volume of transactions become large). In the first, the authorities split the foreign exchange market in order to phase in a devaluation when capital outflows prompt a balance of payments crisis. In the second, the parallel market emerges gradually in response to efforts to maintain an overvalued exchange rate. In the latter case, the authorities are forced to restrict access to the official foreign exchange market for both capital and current account transactions; eventually, controls are tightened and the illegal market begins to acquire macroeconomic importance. In what follows we use the case studies to illustrate these two distinctive patterns.

#### **3.1 Dual Parallel Markets to Stem Capital Outflows**

Dual exchange rate systems were generally adopted on a transitional basis at times of balance of payments crisis to limit the inflationary impact of devaluations. The main objective in these episodes was to phase in the required devaluation when problems of macroeconomic management were compounded by capital outflows. The theoretical advantages of dual rates in such a situation are straightforward. Relative to a unified peg, a dual system insulates international reserves from capital outflows, since these lead to a depreciation of the parallel rate rather than to a loss of reserves. Relative to a unified float, a dual system helps to limit the impact of capital outflows on domestic prices, since current account transactions are effected at the official (pegged or managed) exchange rate.

Mexico's dual system, for example, was adopted in August 1982 as part of a policy response to the debt crisis. The system was viewed as a temporary measure to smooth out the possibly adverse effects of the much needed devaluation on domestic prices. Venezuela's system of February 1983 was also adopted on a temporary basis to deal with collapsing oil revenues and massive capital flight during the debt crisis. The use of dual rates in Venezuela was modeled in part on a successful previous experience: in 1960, the government had instituted a dual system as a way of phasing in an official devaluation of 35 percent over a period of three years. The aim in 1983 was similar, as the government envisioned a three-year transition to a unified fixed-rate system, with a cumulative devaluation of 39.5 percent.

In Argentina, legal dual exchange rate systems were adopted as a response to balance of payments crises several times in the eighties. For example, a dual exchange rate system was adopted in June 1981 when Argentina faced a large fiscal deficit, accelerating inflation, an overvalued exchange rate, large capital outflows, and extensive private sector indebtedness. A similar situation led to the re-adoption of a dual exchange rate system in July 1982, after a brief attempt at unification. In addition to these episodes, Argentina had a semi-legal parallel exchange rate system through most of the eighties, since periods of full convertibility (and a truly unified exchange rate) were few.

In most cases the adoption of the system was prompted mainly by fears that the nominal depreciation required to restore external balance in the short run would result in an unacceptable and potentially permanent burst of inflation.<sup>3</sup> A unified exchange rate would likely have to overshoot its equilibrium level, producing a dramatic fall in real wages and facing the authorities with a difficult choice between accommodating increased wage demands and forcing a severe recession.<sup>4</sup> In Mexico and Argentina, such concerns led the authorities to use the commercial rate as a nominal anchor whose

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<sup>3</sup> In Brazil, for example, the devaluations of the mid- and late seventies were associated with a *permanent* increase in inflation (see Kiguel and Liviatan (1988)).

<sup>4</sup> Overshooting is a common feature of floating exchange rates. It is associated with the maxi-devaluation option as well, since the real depreciation required to stem private capital outflows in the presence of generalized uncertainty regarding macroeconomic events may well be larger than the real depreciation consistent with restoration of macroeconomic balance in the medium term.

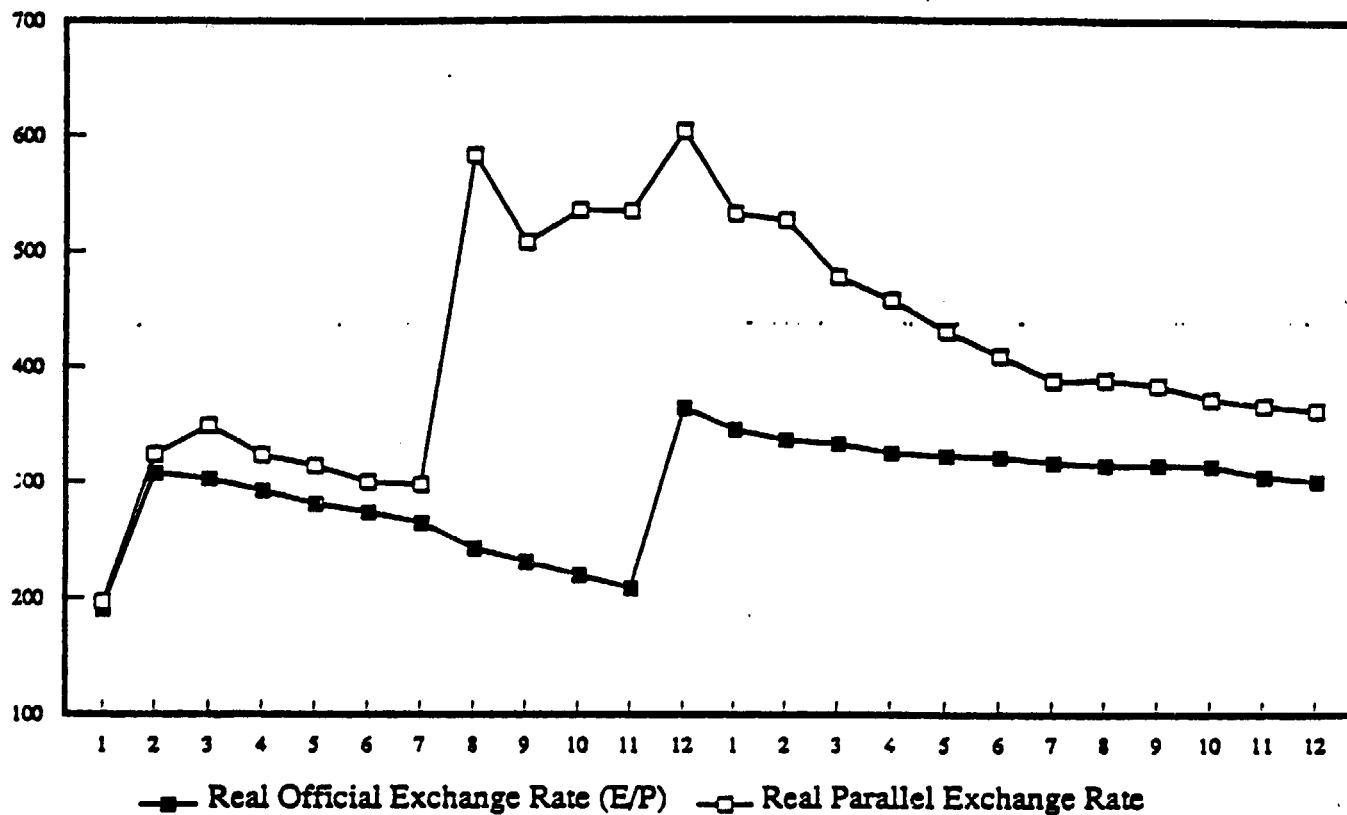
fluctuations were to be minimized or at least smoothed out over time. In Venezuela, the dual regime was instituted in an election year and was designed in part to protect the prices of wage goods. Figure 1 shows the Mexican financial real exchange rate overshooting its medium run level upon adoption of the dual regime in August of 1982; when the authorities devalued the commercial rate three months later, the magnitude of the devaluation was significantly below the initial movement in the financial rate.

Official parallel systems have also been used for brief periods by three of the four African countries in our set of case studies. Ghana and Zambia both had short-lived foreign exchange auctions applying to a substantial share of external transactions in the 1980s. In Sudan, where a pegged dual rate had been used to attract worker remittances and other transactions since the early 1970s, the illegal parallel market was legalized for a brief period starting in mid-1983. In contrast to Mexico and Venezuela, the dual exchange rate systems in Ghana and Sudan were instituted as part of broader attempts to move towards a unified, market-determined official exchange rate and reduce the importance of the illegal parallel market. In both cases, the dual regime allowed for efficiency gains in the allocation of foreign exchange while continuing to protect, temporarily, the real incomes of groups subsidized by the overvalued official rate. The importance of the latter objective is illustrated dramatically by Zambia's 1987 short-lived dual system, which was quickly abandoned when the resulting increases in the prices of wage goods led to riots in the Lusaka Copper belt.

**Figure 1**

# Real Official and Parallel Exchange Rates

Mexico, 1982-83



Source: IFS and World Currency Yearbook

### **3.2 Unofficial Parallel Markets to Maintain Overvalued Exchange Rates**

Unofficial (black) parallel foreign exchange markets exist as a matter of course in most developing countries, in response to ongoing restrictions on capital account transactions in the official foreign exchange market. As with official dual systems, these markets become important at times of balance of payments crisis. But in contrast to the official case, where adoption is often temporary and part of an overall policy adjustment, a growing black market typically reflects a systematic bias against devaluation. Exchange controls are extended to cover not only the capital account but also a broad set of current account transactions. These controls are then gradually tightened in an attempt to resolve fundamental inconsistencies between the exchange rate and the pressure of expansionary macroeconomic policies.

The typical pattern is one where the economy faces a gradual worsening in the balance of payments as a result of expansive monetary and fiscal policies that raise inflation and lead to overvaluation of the official exchange rate. As the government fails to correct this imbalance through a tightening of macroeconomic policies or devaluations of the official rate, it is forced to increase restrictions on the private sector's access to foreign exchange at the official exchange rate. Expectations of a possible maxi-devaluation of the official rate, or of a further tightening of foreign exchange controls, add to the excess demand for foreign exchange in the short run by encouraging inventory accumulation by importers and portfolio substitution away from domestic assets towards foreign exchange. These forces support the demand for foreign exchange in an illegal market. The supply is provided by exporters of goods, tourists, and domestic workers abroad, all of whom may find it profitable to divert foreign exchange from the official to the illegal market.

Each of our case studies of illegal parallel markets presents a period in which the above sequence of events is to some extent applicable. The black market for foreign exchange in Turkey, which had emerged in the early 1940s, expanded significantly in the 1970s, in a period characterized by mounting macroeconomic imbalances and an overvalued official exchange rate. In Sudan, the

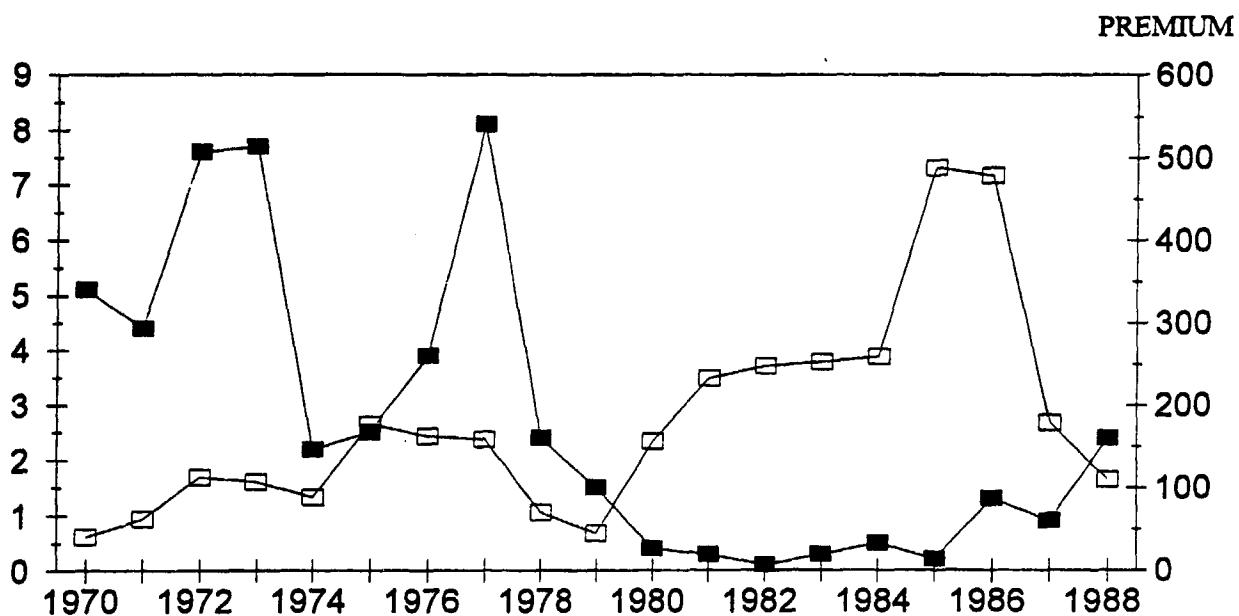


1970s were characterized by expansive macroeconomic policies aimed at supporting ambitious economic development programs. These policies, together with exogenous shocks like the oil price increase of the mid 1970s, resulted in inflation and an appreciating real exchange rate. Since the authorities responded primarily by implementing widespread controls on foreign trade and payments, the black market for foreign exchange expanded to serve a growing volume of illegal transactions on both the current and capital accounts. Ghana also experienced a significant growth in illegal foreign exchange transactions in the 1970s, the result of a reluctance to devalue in spite of rising inflation, balance of payments problems and an overvalued exchange rate. The pressure of excess demand for official foreign exchange in Ghana is evidenced by the size of the parallel premium on foreign exchange, which increased gradually from 50% in 1974 to more than 2000% in 1982. The emergence of a large premium in the parallel market followed a similar pattern in Tanzania and Zambia; Figures 2a-2c show the Tanzanian case. Figure 2a shows international reserves falling to low levels following the collapse of the coffee boom and the import liberalization of 1978; the authorities responded by tightening exchange controls rather than devaluing, with the result of a rising parallel premium. The rising premium and increasing real overvaluation exacerbated the secular decline in official exports, as shown in Figure 2b; Figure 2c shows the resulting fall in officially financed imports as the exchange control regime was tightened further and further.

Why was a tightening of foreign exchange controls preferred over across-the-board devaluations of the official rate, or contractionary macroeconomic policy as way to deal with balance of payments problems? In Tanzania, an aversion to devaluation was established in the late 1960s, rooted in arguments about low supply elasticities in traditional export agriculture and high dependence of the economy on imported intermediate and capital goods. These arguments gave way by the early 1980s to concerns about the adverse effects of a maxi-devaluation on income distribution. In Ghana, the maxi-devaluation of 1971 was followed immediately by a military coup. The association of these two events, whether causal or not, exercised a strong influence against devaluations throughout the

Figure 2.a

## Internatinal Reserves and Premium Tanzania: 1970-88



■ International Reserves/GDP (%)  
□ Parallel Premium (%)

Figure 2.b

## Exports , Real Exch. Rate and Premium Tanzania: 1970-88

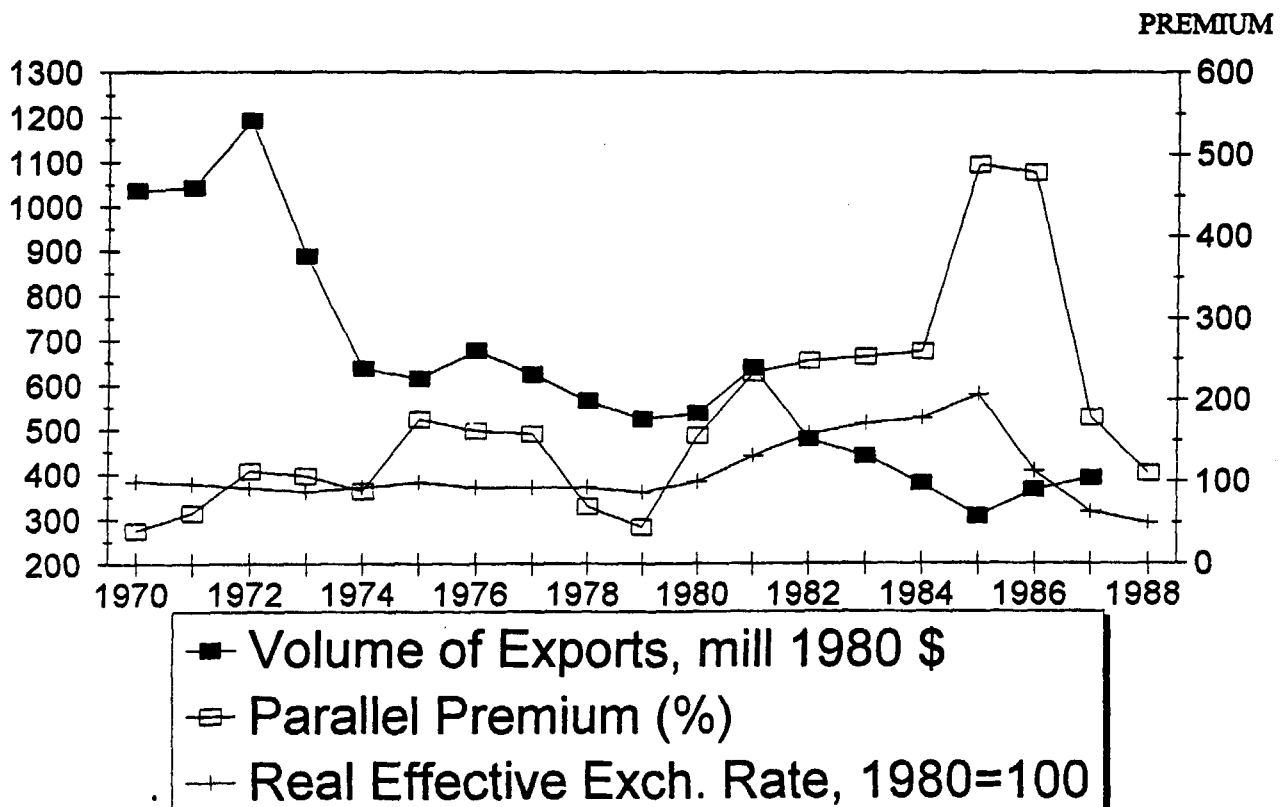
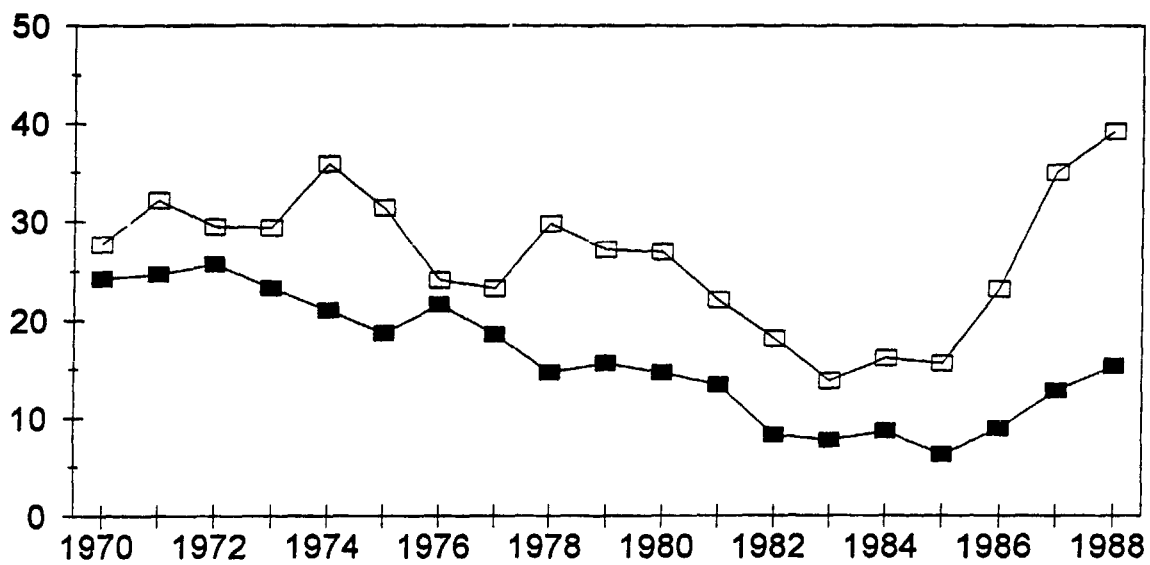


Figure 2.c

### Trade Shares of GDP Tanzania: 1970-88



■ Exports of Goods and Services/GDP %  
□ Imports of Goods and Services/GDP %

1970s. In Zambia, exchange rate policy evolved beginning in the early 1970s as a shifting bargain between the Government, external creditors, and an urban constituency subsidized by overvalued exchange rates. Political pressures made overvaluation increasingly hard to avoid as urbanization proceeded and copper prices--and with them, real incomes--declined starting in the mid 1970s.

## 4. Empirical Findings

### 4.1 Determinants of the Premium: Theory

A fundamental lesson of the theoretical literature on parallel exchange rates -- reviewed in Agénor (1990a,1992) and Lizondo (1990)--is that the parallel premium is jointly determined by asset market conditions and the parallel current account. Portfolio decisions and expectations play a central role in the short run; most models predict, for example, that the parallel exchange rate will depreciate and the premium increase in anticipation of a devaluation of the official rate or an increase in the money supply. Likewise, the premium will rise if there is an unexpected expansion in the money supply. In the longer run, current account influences dominate; a tightening of restrictions on imports at the commercial rate, for example, raises the premium in the long run as imports are "diverted" to the parallel foreign exchange market.

Most of the case study authors adopted an analytical framework based on the standard stock/flow model from the flexible exchange rate literature.<sup>5</sup> We therefore use this model to introduce the basic issues regarding determination of the parallel premium. The model is depicted in Figure 3 [cf. Dornbusch and Kuenzler (1993)]; details are in the appendix.

In the short run, the parallel exchange rate is determined by portfolio equilibrium. The demand for dollars is the downward-sloping function DD. Since capital account transactions take place at the parallel exchange rate, a key determinant of the domestic currency return on foreign assets is the expected rate of depreciation in the parallel market. Letting  $U$  be the parallel rate, this expected

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<sup>5</sup> The paper by Kouri (1976) was adapted to the dual markets case by Flood (1978), Marion (1981) and Lizondo (1987), and to the black markets case by Dornbusch, et al (1983), Macedo (1987), Karrin (1988) and Pinto (1991).

rate of depreciation is given by  $(U_{t+1}/U_t) - 1 = (E_{t+1}/E_t) \cdot (Z_{t+1}/Z_t) - 1$ , where  $E$  and  $Z$  are the official exchange rate and the parallel premium.<sup>6</sup> Given the current premium, therefore, the demand for dollars increases (shifting DD to the right) with increases in either the expected rate of *official* depreciation or the expected future premium, since these raise the yield differential in favor of dollars. By the same logic, the DD curve shifts to the left with a rise in the interest rate on domestic assets. A rise in the dollar value of domestic assets shifts DD to the right, as wealth holders seek to re-balance their portfolios.

The existing stock of net foreign assets ("dollars") held privately is  $F$ . Portfolio equilibrium prevails when this stock is willingly held; this occurs at point 0, where DD and F intersect. The premium is therefore an increasing function in the short run of the expected future premium, the real stock of domestic financial assets, and the official interest parity differential, since these all increase the portfolio demand for dollars; it is a decreasing function of net foreign assets.

A second set of influences on the parallel premium comes from the parallel trade balance, shown on the left in Figure 3. While the details differ, the underlying mechanism is independent of the legality of transactions at the parallel rate. The flow supply of dollars ( $S$ ) comes from legally assigned exports, export smuggling and underinvoicing, and import overinvoicing; the flow demand ( $D$ ) comes from legally assigned imports and import smuggling. A rise in the premium stimulates the flow supply and discourages the flow demand, resulting in an increased parallel current account. The requirement that the parallel current account eventually be balanced therefore implies a long-run relationship between the premium and other determinants of the parallel current account.<sup>7</sup> A real appreciation, for example, worsens the parallel current account by reducing aggregate exports (which in turn reduces export smuggling, given the parallel premium) and increasing the incentive for import smuggling into the domestic market; this drives up the premium in the long run. A rise in import

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<sup>6</sup>  $Z = U/E$  is one plus the parallel premium. Variables dated  $t+1$  are expected values.

<sup>7</sup> Including the stock of foreign assets, if interest income goes through the parallel market.

tariffs (or a fall in export taxes) worsens the parallel current account by encouraging smuggling and underinvoicing of imports; thus the parallel premium rises.

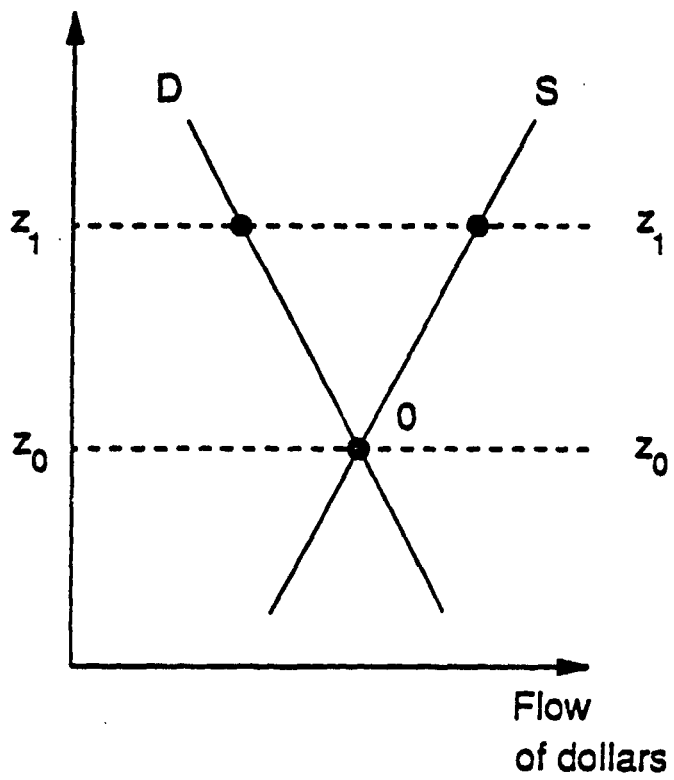
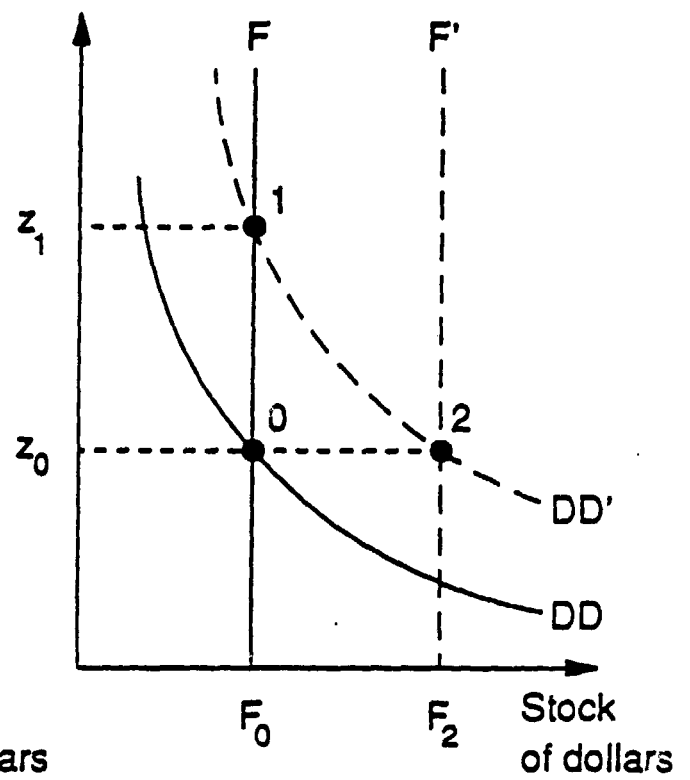
Adjustment to the long run is governed by the evolution of asset stocks and expectations of depreciation over time. Since net capital flows at the pegged official rate are typically prohibited (through export surrender requirements and rationing of foreign exchange for imports), the primary source of changes in the stock of foreign assets is the parallel trade balance.<sup>8</sup> This implies that the 'flow' or 'trade balance' determinants that matter in the long run can also influence the premium in the short run. Similarly, domestic asset stocks change primarily through monetary financing of the fiscal deficit; this gives fiscal variables a potential role in both the short and long run. Figure 3 shows adjustment over time to an increase in the domestic money stock measured in dollars, under the assumption that the official exchange rate remains fixed. Starting at point 0, the monetary expansion shifts the DD curve to the right and increases the premium to  $Z_1$  in the short run; the premium subsequently falls as the parallel current account surplus leads to an increase in private holdings of foreign exchange. Under static expectations regarding the parallel rate, adjustment occurs along DD, from point 1 to point 2. Under rational expectations, market participants foresee the appreciation that occurs in the parallel market during the adjustment path; this reduces the demand for dollars, implying a smaller initial increase in the premium, and adjustment to point 2 takes place along a downward-sloping path below DD.<sup>9</sup>

The model has strong predictions regarding the signs of the coefficients in regressions for the premium. An increase in real domestic money, or in the interest parity differential in favor of foreign assets, for example, raises the premium in the short run. This effect may persist in the long run if the parallel current account includes interest income on foreign assets; otherwise, the portfolio

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<sup>8</sup> An exception is when the authorities intervene at the 'free' rate, as in Mexico.

<sup>9</sup> We assume in Figure 3 that interest income channeled through the parallel market is negligible; in this case, the monetary expansion has no long-run effect on the premium. If interest income is important, the accumulation of foreign assets would shift S to the right over time, and the premium would fall in the long run.

**Figure 3**Parallel  
premium,  $z$ Parallel  
premium,  $z$ 



determinants have no long-run influence on the premium. A real appreciation of the official exchange rate or a tightening of import restrictions raises the premium in both the short run and the long run. The nominal exchange rate affects the premium only indirectly, through real money balances or the real exchange rate; nominal devaluations therefore have no effect on the premium if they are fully offset by money growth and domestic inflation.

If the parallel current account is modeled in more detail and the real exchange rate is endogenized, variables like aid inflows and the terms of trade enter the equation, often with theoretically ambiguous signs. In a black market system, for example, a terms of trade improvement can lower the premium through an induced liberalization of official import allocations and an increased supply of export smuggling dollars; it can raise the premium, however, if the income effect is sufficiently strong to appreciate the real exchange rate for imports and lead to an increased demand for import smuggling.<sup>10</sup> The domestic money stock can also be endogenized via a government finance condition, leading to an important role for the fiscal deficit.

#### 4.2 Determinants of the Premium: Results

An empirical specification for the stock/flow model is derived in the Appendix. Versions of this equation were estimated for Argentina, Ghana, Sudan, Tanzania, Zambia, and Turkey.<sup>11</sup> As indicated in Table 3, the case studies differed with respect to the frequency of the data, the details of the estimation technique, and the degree to which variables like real money balances and the real exchange rate were endogenized.

Table 4 summarizes the empirical results, which largely conform to the predictions of the stock/flow model. The table identifies short and long-run effects where possible, indicating with +

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<sup>10</sup> It may also lower expectations of official devaluation, but this effect is already being controlled for since the uncovered official interest parity differential, which is included in the equation, reflects the rate of expected official depreciation. Note also that the terms of trade can enter the model directly through the parallel current account (as a component of  $x^f_0$ ).

<sup>11</sup> Similar specifications are derived and estimated by Azam and Besley (1989), Agénor (1990b), Chhibber and Shafik (1991), Dornbusch, et al (1983), Kamin (1992), Kaufmann and O'Connell (1991), Kharas and Pinto (1989), Phylaktis (1992), and others.

**Table 3 Versions of the Parallel Premium Equation**

**Argentina:** monthly and quarterly cointegration equations for the parallel rate, using a partial equilibrium stock/flow model.

**Mexico:** quarterly structural VAR for the parallel premium and five other macro variables (the commercial exchange rate, the price level, the money stock, the interest rate, and output).

**Venezuela:** descriptive analysis guided by a stock/flow model modified to incorporate import restrictions.

**Ghana:** annual equation for the parallel premium, using the flow equilibrium condition for the illegal current and capital accounts.

**The Sudan:** quarterly cointegration and error-correction equations for the parallel premium, based on a stock/flow model with expectations of official devaluation endogenized.

**Tanzania:** annual dynamic equations for the parallel premium, using a partial equilibrium stock/flow model with the real exchange rate endogenized.

**Zambia:** annual modified error-correction equation for the parallel premium, using a stock/flow model with the real exchange rate and expectations of official devaluation endogenized.

**Turkey:** monthly dynamic equations for the parallel premium, using a partial equilibrium stock/flow model adjustment for domestic currency accounts.

**Belgium:** monthly exploratory dynamic equations for the parallel premium using stock and flow determinants.

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*Sources:* Case study papers.

Table 4 Determinants of the Parallel Premium

|  |       | ARG                             | GHA | MEX <sup>3</sup> | SUD            | TAN | TUR | ZAM            |
|--|-------|---------------------------------|-----|------------------|----------------|-----|-----|----------------|
| <b>PORTFOLIO DETERMINANTS</b>              |       |                                 |     |                  |                |     |     |                |
| Real Money Balances<br>(M/E)               | Short | +                               |     | +                | +              | +   | +   | +              |
|  | Long  |                                 |     | +                | +              |     | +   | —              |
| Official Interest Rate<br>Parity Deviation | Short |                                 |     |                  | +              | +   | +   |                |
|  | Long  |                                 | +   | +                | +              |     | —   | +              |
| <b>TRADE BALANCE DETERMINANTS</b>          |       |                                 |     |                  |                |     |     |                |
| Official Real Exchange<br>Rate             | Short |                                 |     | +                | +              | +   | +   |                |
|  | Long  | +                               | +   | +                | +              | +   | +   |                |
| Aid  | Short |                                 |     |                  |                |     |     |                |
|  | Long  |                                 |     |                  |                | —   |     | —              |
| Terms of Trade                             | Short |                                 |     |                  |                |     |     |                |
|  | Long  | — <sup>1</sup> , + <sup>1</sup> |     |                  |                | —   |     | — <sup>4</sup> |
| Export Tax Trade                           | Short | — <sup>1</sup>                  | +   |                  | — <sup>1</sup> |     |     |                |
|  | Long  |                                 |     |                  |                |     |     |                |
| Import Tariff Rate                         | Short | +, — <sup>2</sup>               |     |                  | +              |     |     |                |
|  | Long  |                                 |     |                  |                |     |     |                |
| Real Output                                | Short | — <sup>1</sup>                  |     | +                |                |     |     |                |
|  | Long  | — <sup>1</sup>                  | —   | +                |                |     |     |                |

## Notes

\* refers to an estimated effect that is significant at the 10% level or better. For details, see Ansu (1991), Table 1; Aron and Elbadawi (1993), Equation (3.1)<sup>1</sup>; Elbadawi (1993), Equations (12) and (13); Kamin (1991), Tables 2 and 3b; Kaminsky (1991), Table 4; Kaufmann and O'Connell (1993), Table ??; Ozler (1992), Appendix.

1 Effects operating through dollar export prices (+) and dollar import prices (-) were estimated separately and imply conflicting conclusions regarding the terms of trade effect.

2 Results for import tariffs (+) and quantitative restrictions (-) were both insignificantly different from zero.

3 See Kaminsky (November 1991). Results reported here are impulse responses from a structural vector autoregression including the premium, nominal official exchange rate, price level, nominal interest rate, and real output. Short run effects refer to a 1-year horizon and long-run effects to 3 years. Contemporaneous effects on the premium are constrained to zero except in the case of the official exchange rate. Significance levels are not reported.

4 Very close to significance at the 10% level.

or - the direction of the estimated impact over each horizon. Asterisks identify results that are statistically significant at the 10% level or better. We now discuss the results in turn.

#### 4.2.1 Money and fiscal deficits

An expansion of money balances (measured in dollars at the official exchange rate) raises the premium in the short run in all cases. In Sudan, Turkey and Mexico, it raises the premium in the long run as well. These results imply that money growth in excess of the rate of official depreciation will raise the parallel premium. Given the tight link between government deficits and money growth in many of these countries, this suggests that a major reason for persistently high premia in some of the case study countries may be inconsistency between the deficit and exchange rate policy.

As discussed in Lizondo (1990), the theoretical literature is nearly unanimous in predicting that an increase in the fiscal deficit, other things equal, leads to an increase in the premium.<sup>12</sup> Figure 4 uses a larger cross-section to confirm that countries that on average have large budget deficits also tend to have large premia in the foreign exchange market.<sup>13</sup> This finding is corroborated by time series/cross section evidence for a large sample of developing countries in Ghei and Kiguel (1992); Marion (1992) provides similar evidence of Belgium, France and Italy.

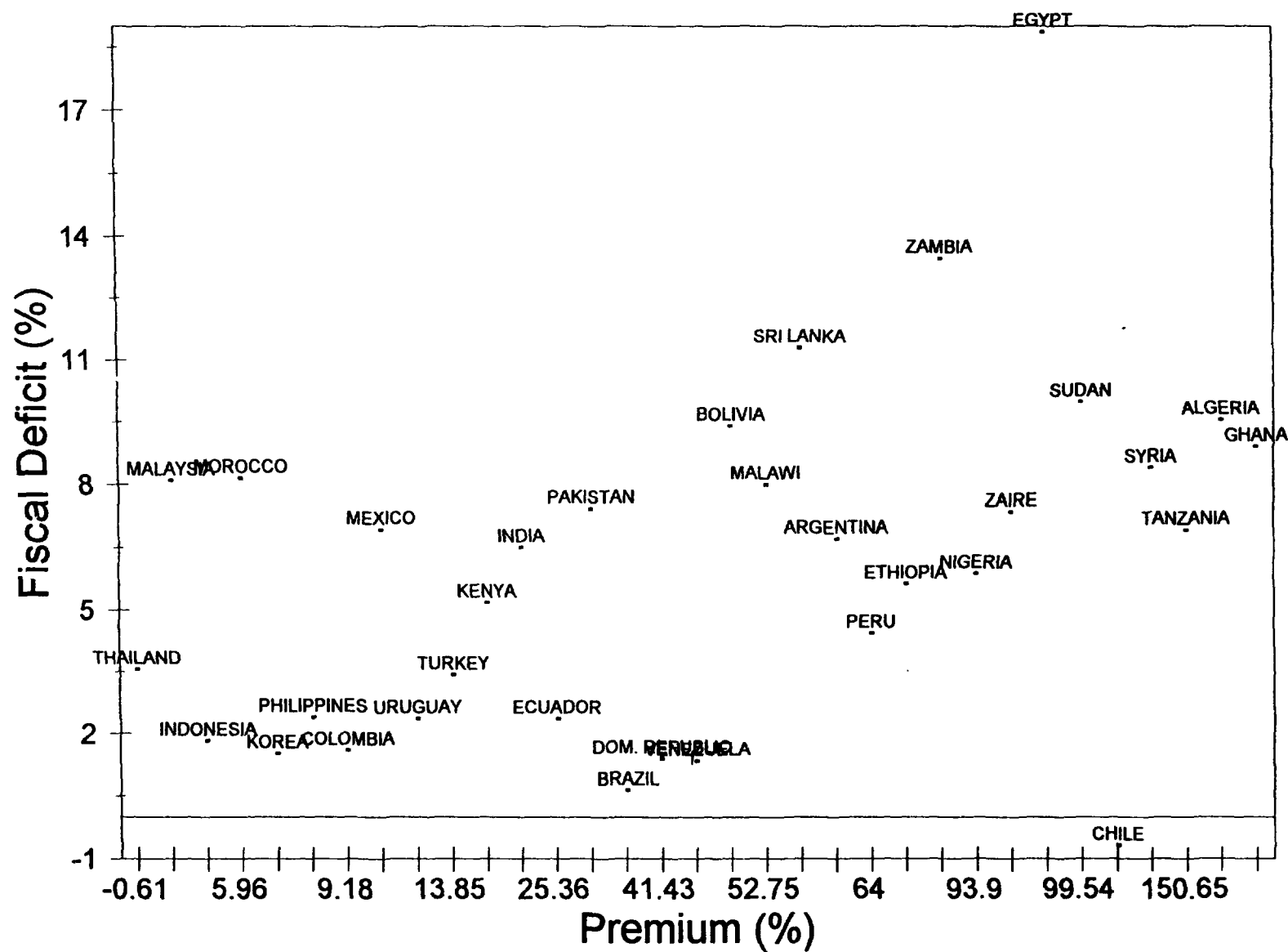
#### 4.2.2 Interest rates and expected depreciation

Table 4 also shows that increases in the interest parity differential increase the premium in the short run, as predicted by the theory; in some cases, this effect persists in the long run. Since variation in this variable is dominated by changes in expected depreciation, this implies a powerful role for exchange rate expectations in determining the premium.

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<sup>12</sup> The main exceptions are models in which Ricardian equivalence holds and prices are fully flexible, a set of circumstances that is not very relevant from an empirical point of view.

<sup>13</sup> The figure uses average values of variables for the period 1976-89. The simple correlation between the two variables is positive (.39) and statistically significant.



The fundamental role of asset markets in the determination of the parallel rate is underscored in the Argentina case by separate evidence suggesting that domestic interest rates embodies an unbiased prediction of the rate of devaluation in the parallel market, as would be implied by a well-functioning asset market under rational expectations.

#### 4.2.3 *Do devaluations affect the premium?*

We mentioned above that the theory suggests that the premium is unaffected by an equi-proportionate increase in the nominal money stock, the domestic price level, and the nominal exchange rate. In all cases but Argentina, the authors imposed this homogeneity restriction by entering the nominal exchange rate only indirectly, through real balances and the real exchange rate. The results in these cases suggest that an official devaluation that is not offset by domestic money growth and inflation will lower the parallel premium, as predicted by the theory. In Argentina, the homogeneity restrictions were tested and could not be rejected.

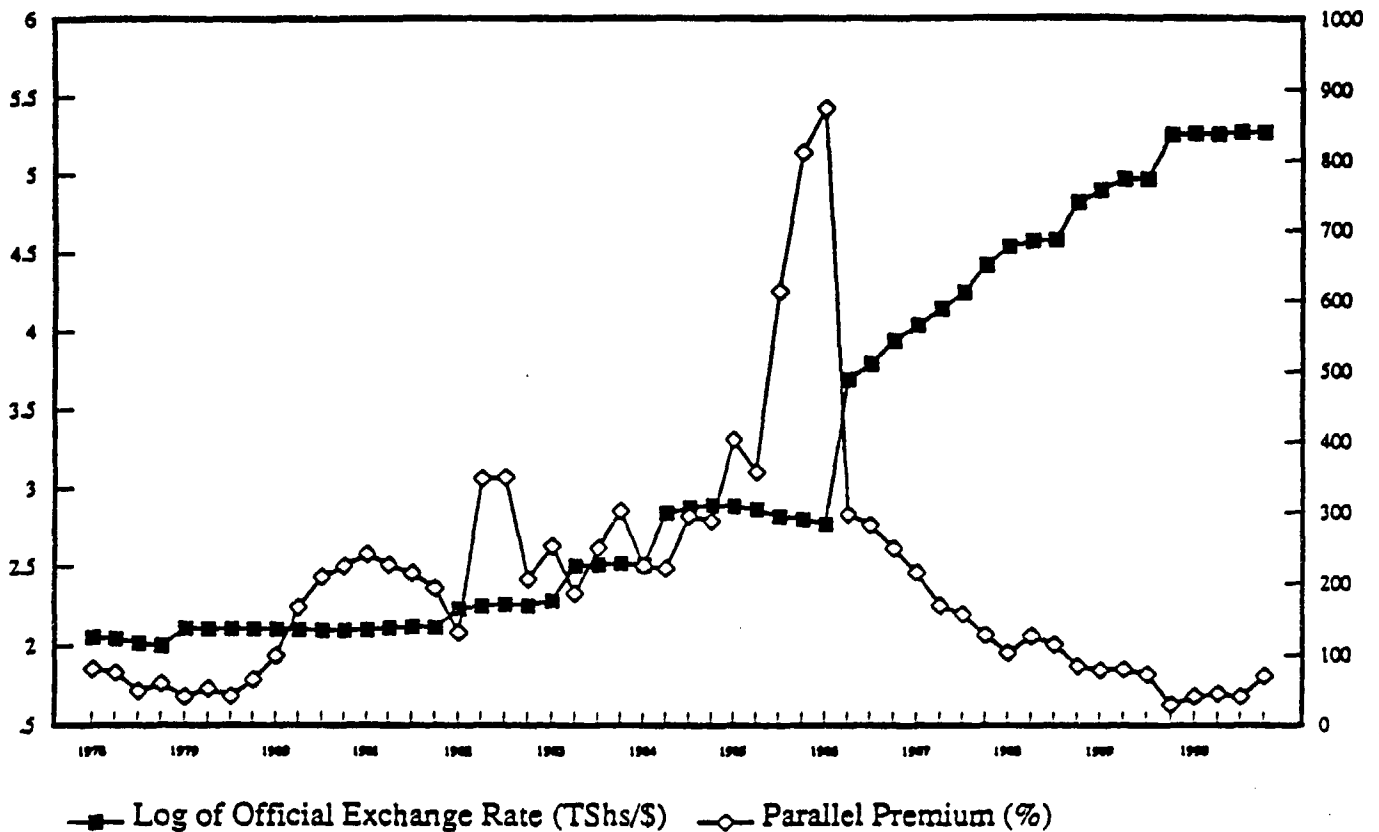
Long-run homogeneity is further supported by the descriptive analysis in some of the case studies. In general, the evidence suggests that in the absence of supporting macroeconomic policy fundamentals, the effect on the premium of a devaluation of the official rate is negative but very transitory, often lasting less than a quarter. Figure 5 makes this point dramatically for Tanzania; each of the three substantial devaluations implemented between 1981 and 1985 reduced the premium on impact, but for two of the devaluations this effect was completely reversed in a single quarter, and for the third it was reversed in two quarters.

Figure 6 provides further evidence of the cycle of official devaluations and increases in the premium countries can experience if policy-makers fail either to address underlying sources of high monetary growth or to accommodate these sources through continuous exchange rate adjustments.

Figure 6a shows the Venezuelan premium during the dual exchange rate episode of 1983-89. Having emerged on implementation of the dual system, the premium rose to above 200 percent by late

**Figure 5****Tanzania: Official Exchange Rate and Parallel Premium**

Quarterly, 1978:1 - 1990:4



Source: IFS, World Currency Yearbook, and Kaufmann and O'Connell (1991)

Figure 6.a

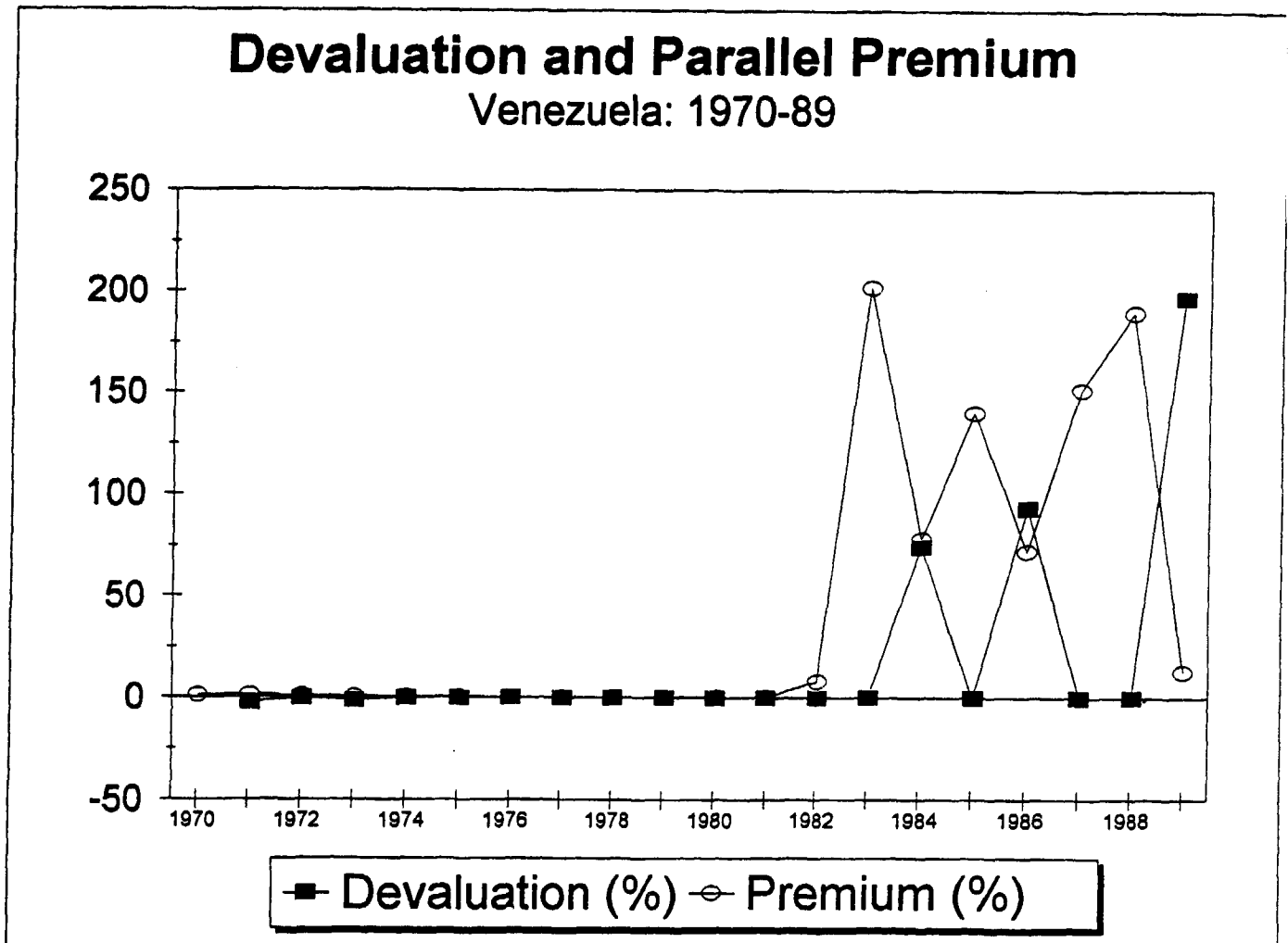




Figure 6.b

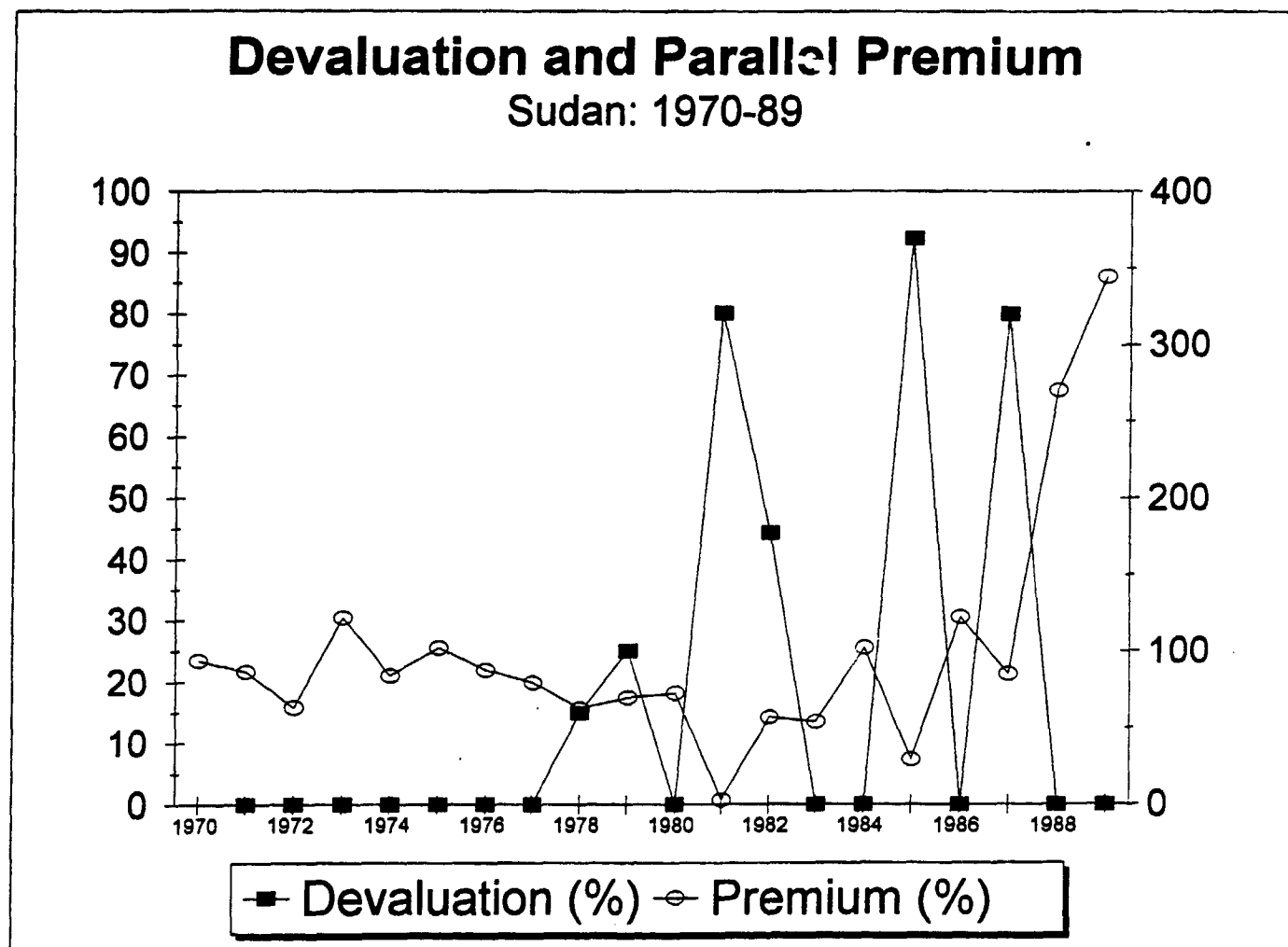


Figure 6.c

## Devaluation and Parallel Premium

Turkey: 1970-89

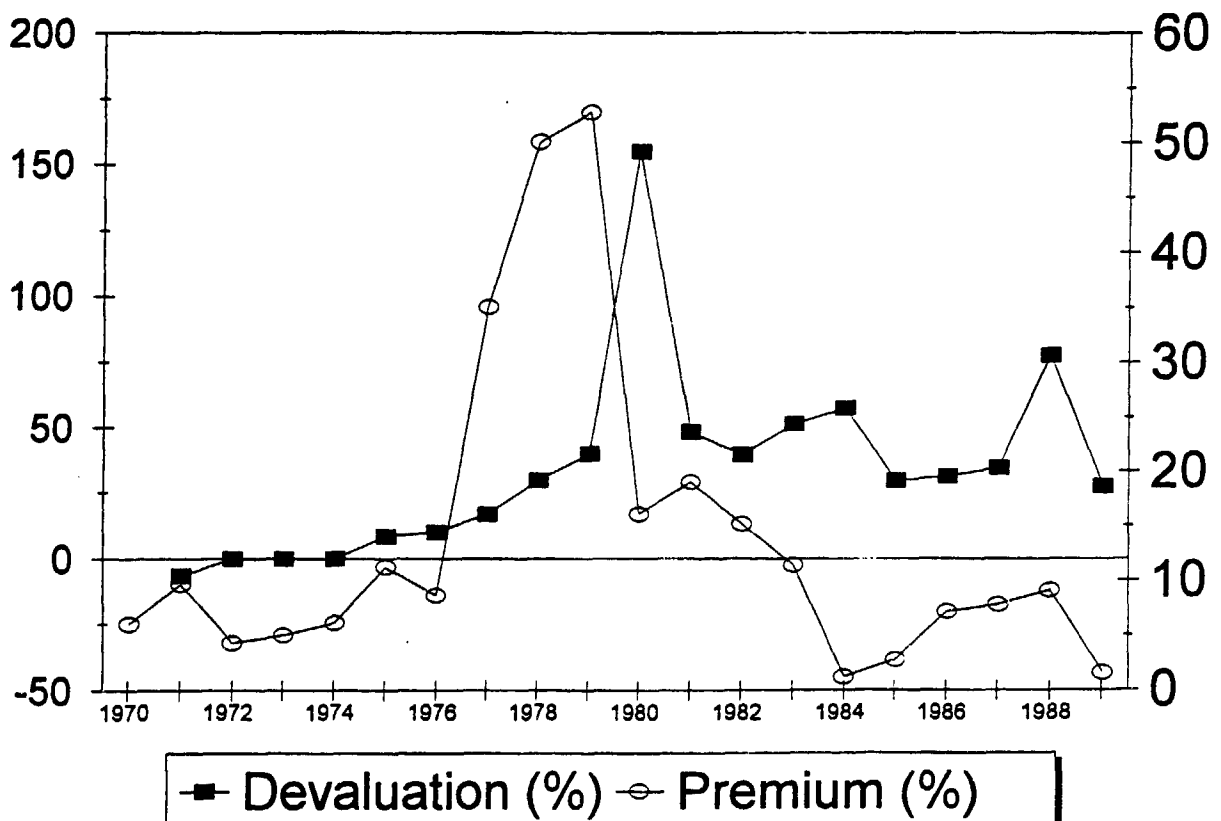
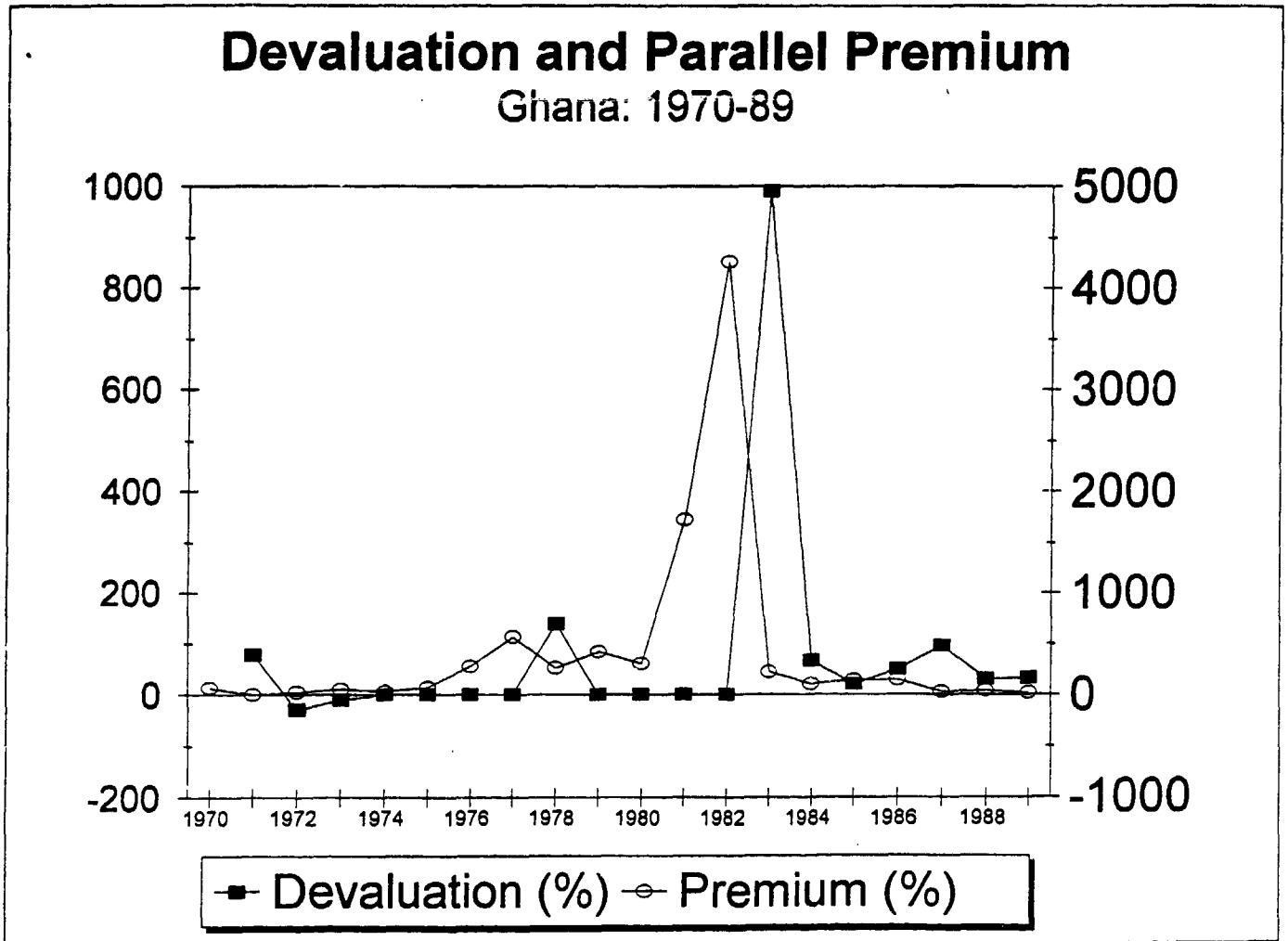


Figure 6.d



1983. The devaluation of early 1984 cut the premium nearly in half. In the absence of a change in underlying policies, however, the premium resumed its increase until a second maxi-devaluation was implemented in late 1986. The devaluation-premium cycle was finally eliminated when the foreign exchange market was unified in 1989.

The Sudan provides an even more dramatic example of the devaluation-premium cycle. Figure 6b shows the results of four maxi-devaluations in the 1980s, each of which brought down the premium significantly. After each of these episodes, however, the premium began to rise again, reaching very high levels (exceeding 100 percent) before being brought down again through a new devaluation.

Turkey and Ghana provide examples of the role of macroeconomic adjustments in achieving a more sustained reduction in the premium. In Turkey (Figure 6c), the premium rose dramatically during the late 1970s and early 1980s as a result of problems in the external sector and acute macroeconomic instability. It was brought down definitively by the devaluation in 1981, which was part of a broader package that included a reduction in the budget deficit and adoption of a crawling peg. Ghana's premium (Figure 6d) was reduced permanently with the devaluation of 1983, thanks to a broad-based macroeconomic reform program that combined fiscal austerity with adoption of a more flexible exchange rate and substantial new aid inflows.

#### 4.2.4 Flow determinants

On the current account side, a real appreciation increases the premium in both the short run and the long run, as suggested by the theory. Since exchange rate expectations are already captured in the interest parity variable, this result points to the powerful effect of overvaluation on aggregate trade flows. A real appreciation reduces aggregate exports and (holding trade policy constant) increases imports; for a given premium, this means a decreased flow supply of dollars and an increased flow demand. The premium rises both in the long run, to restore balance in the parallel current account, and in the short run, through expectations of higher future premia. Results for aid and the terms of

trade, two variables with theoretically ambiguous effects on the premium, are available for a subset of the case studies. The estimated effects are generally statistically insignificant. They tend uniformly to be negative, however, suggesting that these variables affect the parallel trade balance mainly through the net supply of dollars rather than through income effect that raise total spending. The evidence on trade policy is limited to Argentina, Ghana and Sudan, but in these cases the variables generally enter with the right sign, indicating that a tightening of restrictions on imports or a cut in the export tax rate increases the premium. Interestingly, adoption of an own-funds scheme, which amounts to a liberalization of imports at the parallel rate, appears to increase the premium in the Tanzanian case, as predicted by the theory.<sup>14</sup>

#### 4.2.5 *Determinants of the Premium: The Overall Picture*

Taken together, the results in Table 4 suggest that macroeconomic forces, particularly those influencing the real exchange rate, asset stocks and exchange rate expectations, play an important and systematic role in determining the parallel premium across a wide range of individual countries. These findings are corroborated by those of Ghei and Kiguel (1992), who estimate a version of the stock/flow model using a cross-country sample of developing countries (a sample that includes, but is not limited to, the case study countries). Ghei and Kiguel find that the portfolio variables and the real exchange rate explain a large percentage (above 70 percent on average) of the variability in the spread between the official and the parallel exchange rates. The results are strongest for countries with premia exceeding 35 percent, a category including most of the case study countries.<sup>15</sup> Moreover, the cross-sectional structure of the sample allows a formal test for differences in the determination of the premium according to the legality of the parallel rate; as suggested by the qualitative similarities across

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<sup>14</sup> In an own-funds scheme, individuals are granted import licenses without being asked where they obtained their foreign exchange. This tends to raise the premium because the flow demand for foreign exchange increases while the flow supply, in the absence of strong output effects from the import liberalization, is unaffected (unless exports are simultaneously liberalized). O'Connell (1992) provides a theoretical treatment.

<sup>15</sup> The results are somewhat weaker for countries with moderate premia (ranging from 10 to 35 percent), and poor for countries with premia below 10 percent.

countries in Table 4, it is impossible to reject the hypothesis that the model is identical for countries in which the parallel rate is official and unofficial.

## 5. Premium, the Balance of Payments and Inflation

This section evaluates the impact of the parallel foreign exchange markets on the balance of payments and inflation.

### 5.1 Limited Insulation of the Balance of Payments

In theory, dual systems insulate international reserves from capital flows and portfolio shifts while allowing the authorities to maintain full convertibility for current account transactions. In practice, the picture is more complicated because the size of the premium affects official trade flows and because of leakages the authorities are not able to fully separate capital and current account transactions. The empirical evidence from the case studies and elsewhere indicates that insulation is far from complete, and that it is a declining function of the size of the parallel premium, and the length of time that the system remains in place. Table 5 summarizes the findings of the case studies on trade flows, trade taxes, and capital flight. The major linkage explored in the case studies was between the parallel premium and official exports. In all four countries for which evidence is available (Argentina, Ghana, Sudan, and Zambia), a rise in the parallel premium reduces a major category of official exports (cocoa and copper, respectively, in Ghana and Zambia; and aggregate exports in Argentina, and Sudan) as a result of misinvoicing or smuggling. In Ghana, for example, as a result of exchange rate overvaluation and growth in the parallel premium exports in 1985 were just 11.6 percent of GDP, as compared with 23.9 in 1970.

There is also evidence that the dual system fails to insulate reserves from capital flows. For Argentina, Kamin finds that agents resorted to overinvoicing of exports and underinvoicing of imports

in order to gain access to foreign exchange at the official rate. In addition, they were able to evade restrictions on capital account transactions by using special financial arrangements available to exporters (pre-export financing). Marion (1992) argues that in the French and Italian episodes agents used trade credit to move capital in or out of the countries. Finally, Kaminsky shows that the adoption of the dual system in Mexico failed to stop capital flight. In fact, capital flight was higher after the adoption of the dual exchange rate system than it was before.<sup>16</sup>

The imposition of *strict* foreign exchange controls can of course ensure insulation of international reserves (through rationing). During certain episodes in Ghana and Tanzania, for example, reserves dropped nearly to zero, so that although the exchange rate was nominally pegged, the central bank was unable to intervene in support of the domestic currency. In contrast to most legal dual systems, the exchange control regime in these cases implied no commitment on the part of the central bank to finance a payments imbalance on even a subset of current account transactions.

### 5.2 Temporary Insulation of Domestic Prices

Are parallel foreign exchange markets effective in insulating domestic prices from balance of payments pressures? Much depends on the nature of the balance of payments problem. The evidence from the case studies indicates that parallel foreign exchange markets can at best provide temporary insulation, and mainly when the pressures for devaluation are generated by short term capital outflows. Their scope is much more limited when a devaluation is needed to deal with balance of payments problems resulting from generalized excess demand (i.e. from expansionary domestic policies).

At times of balance of payments crisis the exchange rate tends to be extremely volatile and to overshoot its long run equilibrium level. As we saw earlier in the Mexican case, a dual exchange rate system can limit the inflationary impact of the depreciation by allowing the financial rate to absorb a major share of the balance of payments pressure. Figures 7a and 7b show the monthly evolution of

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<sup>16</sup> One reason for this paradoxical outcome is that the Mexican authorities intervened in the parallel foreign exchange market to avoid a further depreciation of the parallel rate.

Figure 7.a

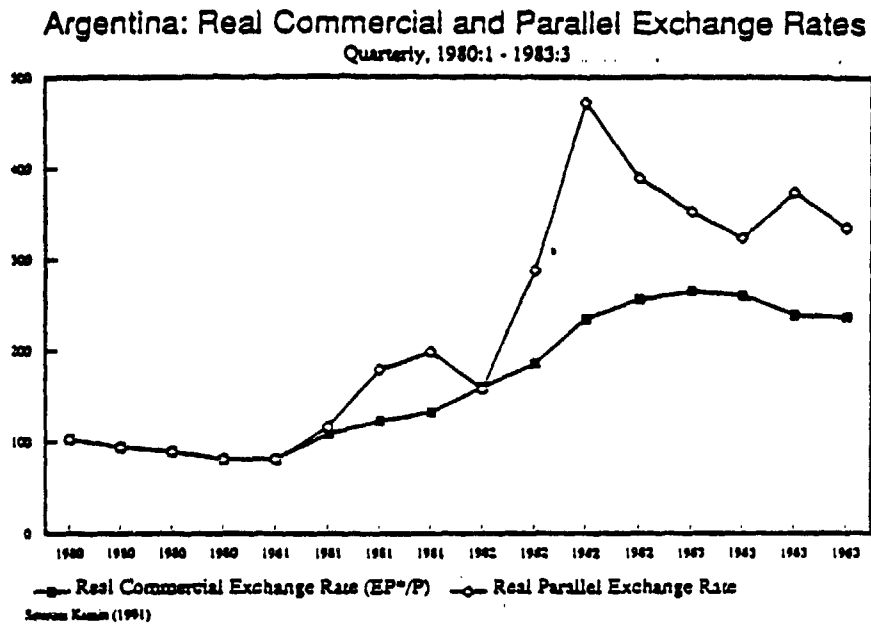
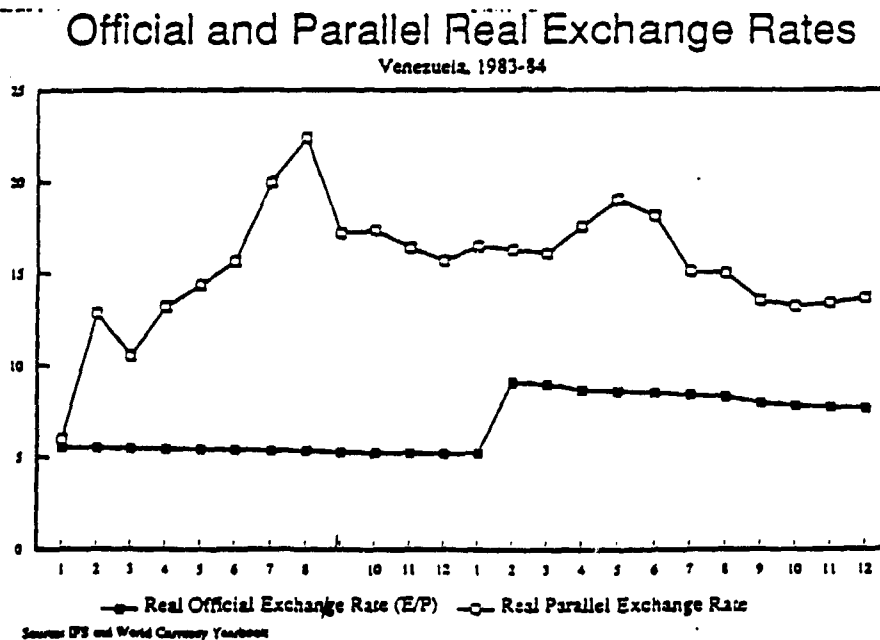


Figure 7.b





the official and the parallel real bilateral exchange rates (vis a vis the US dollar) for Argentina and Venezuela. The figures indicate quite clearly that the parallel exchange rate depreciated drastically at the time of the adoption of the dual system, overshooting its eventual long-run equilibrium level. In both cases, the case study author argues that the dual exchange rate system provided some short-term insulation of domestic prices by channeling most current account transactions to the official foreign exchange market.

The effectiveness of parallel systems in insulating domestic prices is greatest during the first year, however. In most of the episodes, as can be seen from the figure, the real parallel exchange rate started to appreciate around 3 months after the crisis, and stabilized after a period of around 9 months. This indicates that most of the gains regarding insulation occurred during the first 6 to 9 months in which the system was in place, and that they became small after that.

In the longer term, a parallel exchange rate is not an effective way of maintaining low inflation. In fact, the evidence from the case studies (and elsewhere) shows that in countries that fail to control monetary growth, the parallel exchange rate depreciates and domestic inflation continues even if the government keeps a fixed official exchange rate. Chhibber and Shafik (1991) and Ansu (1991) showed that over long periods the parallel exchange rate, rather than the official rate, is the key determinant of cost push influences on domestic inflation in Ghana. Similarly, Aaron and Elbadawi (1992) using annual data find that in Zambia depreciations in the parallel exchange rate led to accelerations in domestic inflation. The Mexican case study also raises doubts about the usefulness of the dual system in insulating prices in the longer term. Kaminsky (1991) compared the time series properties of inflation before and after the adoption of the dual exchange rate system, and concluded that the system provided little (if any) insulation on domestic prices. Finally, Ghei and Kiguel (1992) studied the response of inflation to changes in the parallel exchange rate in a cross-section of developing countries, and found that the parallel exchange rate played a significant role in domestic price determination.

A central message is that insulation can only be effective in the short term; parallel exchange rate systems are not a way to repress inflation. In Venezuela, for example, while inflation did not increase significantly during the early phase of the dual system, it finally went up from 10% in 1982 to around 30% in 1988, mainly because the authorities failed to adopt restrictive policies to deal with external imbalances. Likewise, in Argentina, inflation rose from 150% in 1982 to over 600% in 1985 as a result of large budget deficits and protracted problems in the balance of payments. In the longer term, inflation is determined by domestic policies and not much can be gained by having a parallel foreign exchange market.

## **6. Unification**

This section examines successful and unsuccessful episodes of foreign exchange market unification in the countries included in our project. Unification means different things to different people, but there are two interpretations that are important in practice. The first refers to the adoption of a single exchange rate for all external account transactions, with full convertibility if the exchange rate is managed; this is a movement out of Table 1, and corresponds to what we will term "full unification." The second refers to the adoption of a single exchange rate for all current account transactions, while maintaining convertibility restrictions and therefore a parallel market for portfolio and capital account operations. We term this arrangement "partial unification"; it corresponds to a movement from the right side to the left side in Table 1.

### 6.1 Rapid Unification at Times of Crisis

The three Latin American countries in our project, Venezuela, Mexico, and Argentina, fully unified the foreign exchange market, and paradoxically, this was done at times of macroeconomic crisis. This suggests that multiple systems have not been abandoned because they were no longer necessary to protect international reserves and preserve macroeconomic stability, but because they were no longer able to do so.<sup>17</sup>

Venezuela, after six years of operating a multiple system, unified its foreign exchange market in February 1989 by floating the exchange rate. This move was prompted by severe balance of payments problems, at a time when the premium was close to 200 percent. This large spread generated opportunities for corruption and rent-seeking which created a hostile attitude towards the system. The unification of the exchange markets, which has been maintained so far, was part of a comprehensive stabilization program that included a reduction in the fiscal deficit, trade liberalization, and more reliance on markets; moreover, as we emphasize in the following section, the unification itself exerted a substantial positive effect on the government budget.

Mexico unified its foreign exchange market in December 1987, after more than five years of operating a dual system, into a fixed exchange rate which later turned into a crawling peg. Although formally two markets continued to exist for a number of years, the spread between the two exchange rates was minimal. Unification was undertaken at a time of macroeconomic crisis, the stock market crashed in October 1987, inflation was on a dangerous accelerating path (it exceeded 15% in December), and the parallel exchange rate was depreciating rapidly. Unification was part of package aimed at stabilizing prices and restoring external balance.

Argentina has had mixed success in unifying the foreign exchange market. Two unification attempts failed; the first one, in December 1981, was later reversed due to the suspension of foreign

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<sup>17</sup> An alternative interpretation is that crises present policy-makers with opportunities to reform macroeconomic policies at lower political cost than during normal times. In this interpretation, a dual regime may have served its purpose long ago but unification was postponed because of its political cost.

financing and increased capital flight originating from the South Atlantic war with Great Britain. The markets were unified again in April 1982, but the authorities quickly reversed course, and pegged the exchange rate for commercial transactions, with predictable results: the re-emergence of a parallel market. A more durable unification, to a floating exchange rate, was achieved at the end of 1989. As in other episodes this was done in the midst of a macroeconomic crisis, as the economy was experiencing an explosive hyperinflation. In this instance, the parallel foreign exchange market was abandoned because it did not serve any useful purpose.

## **6.2 Gradual Unification in Highly Distorted Economies**

Unification in Turkey was a gradual process that lasted nearly a decade, with a first phase that concentrated on unification for current account transactions while keeping the premium small, and a second one in which the main objective was to achieve full unification. The process began in 1980 with a maxi-devaluation and a phasing out of multiple exchange rates practices. It also included, in stages, adoption of more flexible exchange rate management so as to maintain a realistic real exchange rate, liberalization of imports, and relaxation of controls on the capital account. Capital account liberalization was completed in 1989 when domestic residents were permitted to purchase foreign securities, and since then the black market has essentially disappeared.

In contrast to the group of Latin American countries, the African economies included in our project have only pursued partial unification, and the move in that direction has been gradual. In Ghana, unification proceeded gradually as part of the comprehensive reform process began in 1983, which included monetary and fiscal restraint, increases in producer prices, relaxation of import controls, and a more flexible management of the official exchange rate. The exchange rate system, which initially consisted of an official market with a rigidly fixed exchange rate and a thriving black market, has been transformed after several modifications into one comprising two legal markets with floating rates and a negligible spread between them, and a reduced illegal market. The black market

premium declined from above 2000% at the beginnings of 1983 to 24% in April 1988, when the second legal market became operational and practically absorbed the black market. The spread between the two legal markets declined gradually and has remained around 5% since April 1990.

Tanzania, in comparison, was well on the way to partial unification by the early 1990s. The premium declined from over 700 percent in 1986 to roughly 50 percent in 1990. Unification, as in most cases, was part of a more comprehensive program that has gradually succeeded in liberalizing markets and restoring macroeconomic stability. Partial unification has taken place in three steps. In 1984, the authorities devalued and introduced an "own-funds" scheme that allowed holders of (illegal) foreign exchange to obtain import licenses freely; by 1986 the own-funds window was financing a third of the total imports bill, with the remainder of imports (and the bulk of exports) going through the official rate. In 1986, the authorities devalued again and adopted a crawling peg and a major macroeconomic reform package, heavily supported by external assistance. More recently, the authorities have introduced private foreign exchange bureaus and opened the bulk of export and import trade to these bureaus.

A common element in the above episodes is the ability to sustain unification. In this respect, the most recent unifications in Argentina, Mexico, Turkey and Venezuela were successful. Likewise, Ghana, and Tanzania have gradually but steadily moved towards reducing the premium, and have remained in a path which appears to lead to full unification. What explains the success in these episodes? Before answering this question it is useful to examine the causes of some of the reversals.

### 6.3 Understanding Reversals

Among the Latin American countries, Argentina attempted and failed to unify the foreign exchange market twice in the early eighties. In both cases the attempts failed because the authorities maintained expansionary demand management policies (namely large budget deficits financed by money creation) while at the same time they tried to use the official exchange rate as an anchor for

inflation. As the expansionary policies sustained high inflation, the official exchange rate became overvalued and the authorities were forced to introduce foreign exchange controls in order to defend the parity. As a result, a parallel foreign exchange market re-emerged and the unification attempt failed.

Sudan and Zambia provide examples of partial unification attempts that were reversed. Sudan tried to unify its foreign exchange market as part of a series of liberalization and stabilization program started in 1979. In this process, the exchange system underwent numerous modifications while a growing number of transactions were shifted from the official market to a legalized parallel market in an effort to reduce the coverage of the black market. However, lax domestic policies led to the reappearance of a large black market premium and the expansion of black market transactions. Zambia experienced two failed attempts at unification. The first episode (1983-85) was an attempt at reducing the black market premium based on a crawling peg system for the official exchange rate. This effort, however, was unsuccessful primarily due to large adverse changes in the terms of trade that led to increases in the premium and abandonment of the crawling peg system. The second episode (1985-87) was an attempt at reducing the volume of transactions in the black market using an auction system in the official market. This attempt also failed as lax monetary and fiscal policies led to increases in the premium and the expansion of black market activities.

#### 6.4 Successful Unification Requires Realistic Policies

The choice of exchange rate system adopted at the time of unification does not appear to be a critical determinant of success. Some countries (Ghana, Turkey) unified to a crawling peg, others to a fixed exchange rate (Mexico, and Venezuela in the 60s) and a third group to a floating exchange rate (Argentina and Venezuela). The key element for successful unification has been the acceptance of the need for consistency between the unified exchange rate and monetary and fiscal policy. In practice,

this has meant that exchange rate policy had to accommodate the underlying inflationary pressures generated by the fiscal deficit.

In countries that attempt to bring inflation down and improve the external balance at the time of unification, the process needs to be accompanied by fiscal and credit policies that are supportive of this objective. This was the approach followed in Mexico, Ghana, Turkey and Venezuela, where the unification efforts were supported by cuts in the budget deficit and a tightening in domestic credit. While inflation did not always fall after unification, the authorities accommodated the inflation sufficiently to avoid severe overvaluation, and the overall macroeconomic situation usually improved, minimizing the prospects for a reversal.

In other cases unification was possible while the economies maintained important macroeconomic imbalances. In Argentina, for example, the foreign exchange market was unified in December 1989 when the government was still running large budget deficits and needed to resort to the inflation tax. While unification was possible, it required the acceptance of a rapidly depreciating exchange rate in order to avoid a real appreciation while inflation continued. While the Argentine hyperinflation is an extreme example, in the other successful episodes the authorities adopted an exchange rate policy which, to different degrees, accommodated domestic inflation.

Regarding speed, the Latin American episodes suggest that a quick unification is desirable at times of macro-crisis (especially when inflation is getting out of control). However, these economies were by and large less distorted than the others included in the project and their capital markets are better integrated to the world financial markets. The maintenance of a parallel foreign exchange market (and a relatively large spread) was difficult to sustain because agents could easily find ways to beat the system.

In economies that start from a situation with extensive price controls, barriers to trade, and thin financial markets a gradual approach could well be appropriate. In Turkey, and Ghana (and to some extent in Tanzania) unification in the foreign exchange market has moved *pari passu* with the

implementation of structural reforms aimed at enlarging the role of market mechanisms in determining resource allocation, an approach that was by and large successful.

Last, but not least, success largely depends on the authorities' commitment to the unification effort. This is crucial because unification may have some short-term adverse consequences such as a temporary increase in inflation or an undesired drop in real wages. To the extent that the authorities are determined to proceed with unification despite these short-term difficulties, the policy can be sustained. Inflation increased upon unification in Venezuela, but the authorities did not revert their policies because they were convinced that a sustained reduction in inflation would be obtained by prudent monetary and fiscal policies rather than by the splitting of the foreign exchange market. In contrast, in the unification efforts in Zambia were not sustained because the government was unwilling to accept the large and possible continued depreciation required to maintain equilibrium in the official market.

## **7. Some Pleasant (Quasi-?)Fiscal Arithmetic**

Although the fiscal consequences of parallel exchange rates are emphasized in theoretical work, little is known at the empirical level. In this section, we provide estimates for some countries in our project. We acknowledge in advance that these estimates are rough and partial, as problems in measuring public sector deficits are well known, and we needed to make some heroic assumptions regarding the shadow equilibrium exchange rate. Pinto (1989) has cautioned that unification constitutes a fiscal shock that may require an increase in inflation; our results suggest that the outcome in practice is often more pleasant (and the implications of parallel rates correspondingly more unpleasant).

Equation (1) summarizes the fiscal impact of parallel exchange rates

$$(1) \quad (D^* - D) + [(E^* - E)(x - m)]$$



A  $E^*$  over a variable indicates the level it would take in a hypothetical unified system. Thus,  $E^*$  is the exchange rate that would be consistent with equilibrium in the balance of payments in a unified system.  $D$  denotes the non-financial public sector deficit;  $x$  and  $m$  denote central bank purchases and sales of foreign exchange from the private sector.

The first term in brackets in equation (1) shows the effect of the multiple system on the non-financial public sector's budget. The second term shows the implicit gains or losses incurred by the central bank in its foreign exchange transactions with the private sector under the multiple system.

Table 6 presents the evidence from five countries in our project, with the information classified in terms of the two components of (1).<sup>18</sup> While it was possible to obtain specific estimates for the effect on central bank profits, the effect on the domestic currency budget could be assessed only in qualitative terms, with the exception of the case of Tanzania.

Table 6 shows that the fiscal effect of parallel rates is not uniform across countries. There are countries with central banks profits and others with central bank losses; some in which the domestic currency budget improves and others in which it worsens. Furthermore, the two components of (1) do not necessarily work in the same direction.

The qualitative effect on central bank profits depends primarily on whether the central bank is a net buyer or a net seller of foreign exchange to the private sector.<sup>19</sup> This is particularly the case when the central bank's buying and selling exchange rates for its transactions with the private sector are equal. Since this exchange rate is usually appreciated with respect to the shadow exchange rate (equal to the parallel exchange rate in all the estimations in table 6), net sales to the private sector generate losses while net purchases generate profits. In Zambia, for example, the central bank was a

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<sup>18</sup> For Venezuela and Zambia, the estimates of the effects on central bank accounts reflect our calculations based on data provided by the authors.

<sup>19</sup> Since all foreign exchange transactions of the public sector are usually conducted through the central bank, "central bank" net foreign exchange transactions with the private sector are equivalent to "overall public sector" net foreign exchange transactions with the private sector.

Table 6

FISCAL EFFECTS OF MULTIPLE EXCHANGE RATES

|           | Central Bank<br>Profits | Domestic Currency<br>Budget | Total |
|-----------|-------------------------|-----------------------------|-------|
| Argentina | +                       | -                           |       |
| Sudan     |                         | -                           |       |
| Tanzania  | + -                     | + -                         | + -   |
| Venezuela | -                       |                             |       |
| Zambia    | -                       | +                           |       |

DOMESTIC CURRENCY BUDGET

|           | Effect | Channel  | Method  |
|-----------|--------|--|---|
| Argentina | -      | Export underinvoicing reduces export tax revenue   | Regression of official exports on premium           |
| Sudan     | -      | Reduces revenue from trade taxes   | Regressions of trade taxes revenue on premium       |
| Tanzania  | + -    | Reduces revenue from tax on imports (customs and sales); reduces export producers prices | Assumption  |
| Zambia    | +      | Increases revenue from tax on imports (customs and sales)                                | Correlation coefficient between revenue and premium |

CENTRAL BANK PROFITS FROM FOREIGN EXCHANGE TRANSACTIONS WITH PRIVATE SECTOR

|           | Periodicity | No. Years | <u>Maximum</u>       | <u>Minimum</u> | <u>Average</u> |
|-----------|-------------|-----------|----------------------|----------------|----------------|
|           |             |           | As percentage of GDP |                |                |
| Argentina | Yearly      | 7         | 3.5                  | 1.3            | 2.1            |
| Tanzania  | Yearly      | 14        | 0.4                  | -9.8           | -4.5           |
| Venezuela | Yearly      | 4         | -14.7                | -25.4          | -20.5          |
| Zambia    | Monthly     | 2         | -12.2                | -16.2          | -14.2          |

net seller to the private sector and thus it suffered losses.<sup>20</sup> The same applies to Tanzania, where the central bank was a net seller to the private sector in all the years but one. In Venezuela, the buying and selling rates were different, but the central bank was a net seller by such large amounts that this factor dominated and the central bank suffered losses. In Argentina, the central bank was a net buyer of foreign exchange from the private sector and thus benefitted from the dual exchange rate system.

The magnitude of the effect on central bank accounts may be quite significant. Estimations range from a positive 3.5 percent of GDP for Argentina to a negative of 25.4 percent of GDP for Venezuela.<sup>21</sup> The absolute size of these estimates is almost surely biased upwards since the parallel exchange rate most likely overestimates the true value of foreign exchange, but the estimated effects remain significant even after correcting for a possible bias. For example, using a shadow exchange rate equal to 60% of the parallel exchange rate in the case of Venezuela reduces the estimated average effect on central bank profits from 20.5% of GDP to 4.7% of GDP.

The effect of the multiple system on the domestic currency budget (D) was estimated only for Tanzania. The authors assume that some components of the domestic currency budget (custom duties, sales taxes on imports, and producer prices for exports paid to farmers by parastatals) are fully indexed to the exchange rate, while other components (other tax revenue and public sector wages) are not indexed at all. Under these assumptions, multiple rates have both positive and negative effects on the domestic currency budget. On the one hand, a large spread allows the government to keep producer prices low, thereby reducing expenditure. On the other hand, a large spread reduces declared imports, thereby reducing revenue from import taxes. For the period 1976-89, it is estimated that the multiple system in Tanzania generated a net positive average annual effect equivalent to 2.1% of GDP.

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<sup>20</sup>The estimations shown here for Venezuela and Zambia differ from those presented by the respective authors in their individual case studies. Although the Venezuelan oil company (PDVSA) is publicly owned and the Zambian copper company (ZCCMC) is largely publicly owned, the estimation of the fiscal effect on central bank accounts in the individual case studies treat these companies as part of the private sector. The estimations presented here include those companies as part of the public sector.

<sup>21</sup>Due to lack of detailed information, in the estimation for Argentina central bank foreign exchange sales to and purchases from the private sector include only those arising from merchandise trade transactions, and the central bank buying exchange rate includes export taxes and subsidies.

Although other case studies do not present estimates of the effect on the domestic currency budget that fit directly into the framework above, they offer some evidence about the influence of the exchange rate premium on revenue from trade taxes, which is one of the components of the domestic currency budget. The evidence, however, is mixed. While an increase in the premium seems to reduce revenue from trade taxes in Argentina and Sudan, the opposite appears to be the case in Zambia.

Casual evidence suggests that Ghana and Mexico incurred fiscal losses from having parallel exchange rate systems. In Ghana, most tax revenues in the early 1970s were related to trade. As official imports and exports (especially cocoa) collapsed as a result of the large premium in the parallel market, trade taxes fell from around 8% of GDP in the early 1970s to just 1% in 1982. In the case of Mexico, the public sector is a net "producer" of foreign exchange, as revenues from oil exports far exceed the cost of servicing the public external debt. For example, oil exports generated around US\$16 billion in 1983 and 1984, while net official external transfers were respectively US\$4.2 billion and US\$6.2 billion. On average, the public sector generated US\$10 billion in those years, and in all likelihood was a net seller of foreign exchange to the private sector.

Overall, in the countries that we examined the existence of parallel foreign exchange markets generated fiscal losses. Most of them do not appear directly in the budgetary accounts, which are affected only indirectly. Instead, they were primarily generated by net sales to the private at below equilibrium exchange rates. In most of the countries in our sample the consolidated public sector was a net "producer" of foreign exchange, either because public sector enterprises are the main exporters in the economy (as in Mexico, Venezuela and Zambia), or because the consolidated public sector received large external transfers.

## 8. Final Thoughts

In this section we will elaborate on the policy implications of having or adopting parallel foreign exchange markets in developing countries. The studies done for this project indicate that, on the whole, the experiences were disappointing. Most countries tolerated high premia for long periods, with damaging effects on the allocation of resources and growth. The studies do not indicate any clear gains from keeping the system in place. In what follows we will briefly examine some controversial arguments regarding the use of parallel foreign exchange markets, and provide some insights from our study on each of them.

### 8.1 *In Practice the System is Misused*

The case for a parallel (dual) foreign exchange system is stronger when adopted as a *temporary* option to deal with severe balance of payments crises (e.g. Dornbusch (1986)). Argentina, Mexico, and Venezuela at the time of the debt crisis in fact resorted to the dual system as a way to smooth out the increase in the exchange rate to achieve the required real depreciation. The depreciation in the parallel exchange rate provided a safety valve to absorb the pressure coming from capital outflows, while the official exchange rate continued to serve as a nominal anchor to prices. These arrangements helped the governments for a while in maintaining limited control over domestic inflation, and avoiding a sharp drop in real wages while protecting the balance of payments. In the longer term not much was gained by maintaining the system.

In practice, the effectiveness of a dual exchange rate system is inversely related to the size of the premium and the length of time that it remains in place.

The episodes reviewed in this paper suggest that the dual system was misused more often than not, both in terms of over-extending the duration of the system, and in maintaining a larger premium than it would be desirable. Venezuela, for example, maintained the dual system for six years, Mexico for five, and Argentina for eight years (counting official and quasi-official parallel exchange rates).

The average premium during this period was 44% in Argentina, 30% in Mexico and 120% in Venezuela. In two of these countries, Argentina and Venezuela, there were no clear efforts during this "temporary" period to correct monetary and fiscal policies to restore external balance. Thus, it is doubtful that in these cases the macroeconomic gains (in terms of keeping equilibrium in the balance of payments, and lower inflation) were larger than the costs it has in terms of misallocation of resources. These experiences weaken the case for recommending the adoption of dual exchange rates, even in circumstances when in "theory" it could be appealing.

In other cases parallel foreign exchange markets were used as a long term arrangement to maintain overvalued real exchange rates and expansionary macroeconomic policies in place for prolonged periods. In Ghana and Tanzania, for instance, the authorities had to rely on extensive foreign exchange controls to avoid a full depletion of reserves. The large premia in these economies (in excess of 1,000% at some times) is clear evidence of a dramatic inconsistency between exchange rate policy on the one hand, and monetary and fiscal policies on the other.

While there are numerous examples of macroeconomic mismanagement associated with the co-existence of parallel foreign exchange markets, there are also cases in which the system was used judiciously. Belgium had a dual exchange rate system for more than three decades and the system did not lead to major distortions. Likewise, it is well known that Colombia has maintained an unofficial parallel foreign exchange market for a long time, while preserving overall macroeconomic balance. In these cases, however, the premium was kept low on average (around 2% in Belgium and 6% in Colombia); larger premia were only tolerated on a short term basis as a safety valve to deal with crises. The dual exchange rate system was effective in these two countries because they followed sound macroeconomic policies.

## 8.2 Explaining the Premium: Macroeconomic Factors Matter Most

Regarding the determinants of the parallel exchange rate, the evidence presented in this paper indicates that macroeconomic fundamentals matter most. In particular, the premium reflects inconsistencies between policies affecting domestic absorption (namely monetary and fiscal policies) on the one hand, and the official exchange rate on the other. In addition, in the short run, the premium is largely affected by expectations of the official exchange rate. The studies reviewed in this project also indicate that the distinction between official and unofficial parallel foreign exchange markets is not relevant regarding the determinants of the parallel exchange rate.

## 8.3 Unification: Make Sure it Sticks

A successful unification is one that can be sustained without leading to significant increases in inflation or recurrent balance of payments problems. Sustainable unification requires the adoption of a suitable exchange rate system. In countries where fiscal deficits persist and inflation is bound to continue, this means the adoption of a crawling peg or a managed float. Unifying to a fixed exchange rate in these cases will fail as balance of payments crisis will loom in the near future. In general, it is more difficult to unify to a fixed exchange rate, because it needs a credible commitment to maintain external balance even in the event of external shocks. In this case the prerequisites are a strong fiscal balance and sufficient reserves (or quick access to external credit) to withstand external shocks or speculation against the currency. Unification to a fixed exchange rate without these pre-conditions sets up the stage for a reversal.

How important is unification? There is strong evidence from recent studies on long term growth that large premiums are harmful,<sup>22</sup> as they create numerous microeconomic distortions, and induce corruption. It is thus important to unify quickly, especially the foreign exchange market for current account transactions and ensure convertibility. Automatic access to foreign exchange for trade

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<sup>22</sup> See World Bank (1990), Easterly and Levine (1993).

creates large efficiency gains and increases transparency. Maintaining a parallel exchange rate for capital account and portfolio transactions is not a top priority, as long as the premium remains low (below 10%). Eventually, though, given the leakages between markets full unification makes sense.

Regarding speed our project shows two distinct successful patterns. In countries where the parallel foreign exchange market was introduced to deal with capital flight (e.g. Argentina, Mexico and Venezuela), unification proceeded rapidly, generally as part of a comprehensive stabilization-liberalization package. Unification meant convertibility for current and capital account transactions.

In contrast, unification in Ghana, Tanzania, and Turkey proceeded gradually regarding the reduction in the premium and/or the number of transactions that were channeled to the parallel foreign exchange market. These countries had more extensive controls in the economy and reduction in foreign exchange controls moved in tandem with liberalization in other areas. Experience indicates that legalization of the parallel foreign exchange market is a good first step towards full unification.

Last, but not least, there is puzzle regarding the motivation for the use of parallel foreign exchange markets in the countries that we studied. In most cases the use of the system resulted in large premia and in important fiscal losses. It also clear that these large premia also had detrimental effects on export performance and growth, while it did not provide much insulation from external shocks. It seems that a "rational" government would have pushed for unification. The fact that unification has usually taken long, and not always succeeded indicates that the motivation for the use and maintenance of the system lies beyond economics. Political economy (fears of devaluation) and rent seeking probably played an important role in this respect.



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### Appendix The Stock/Flow Model of Parallel Exchange Rates

Individuals demand domestic (M) and foreign (F) assets in a proportion determined by the difference between their respective expected yields. Letting  $i_t^*$  and  $i_t$  be the foreign and domestic interest rates, and noting that the parallel exchange rate is the price at which portfolio transaction take place, this difference is simply the uncovered interest parity differential  $d_t \equiv i_t^* + \mathcal{E}_t(\ln U_{t+1}) - \ln U_t - i_t$ , where  $\mathcal{E}_t$  denotes an expectation conditional on information available at time  $t$ . Portfolio equilibrium can therefore be written

$$(1) \quad M_t = m(d_t, x_t^p) U_t F_t, \quad m' < 0,$$

where  $m$  is the desired ratio of domestic to foreign assets. Additional determinants of portfolio preferences are captured in the vector of "portfolio" determinants  $x_t^p$ .

Defining (one plus) the parallel premium by  $Z \equiv U/E$ , where  $E$  is the official rate, and noting that the interest parity differential can be written  $d_t = d_t^o + \mathcal{E}_t Z_{t+1} - Z_t$ , where  $d_t^o$  is the interest parity differential at the *official* exchange rate, equation (1) can be rewritten as a dynamic equation for the parallel premium:

$$(2) \quad Z_t = Z_t + \mathcal{E}_t Z_{t+1} - Z_t + m_t (M_t/E_t) F_t d_t^o + x_t^p,$$

We assume that net capital flows at the commercial rate are zero, and that the authorities do not intervene at the parallel rate. Then letting  $e_t$  be the official real exchange rate (with an increase denoting a real appreciation) and  $x_t^f$  be a vector of other variables that affect the unofficial current account (e.g., the terms of trade, trade taxes, and the enforcement effort), we have the following expression for the evolution of private net foreign assets over time:

$$(3) \quad F_{t+1} - F_t = i_t^* F_t + h(Z_t, e_t, x_t^f),$$

where  $h$  is the parallel trade balance.

Since private stocks of foreign exchange are typically not observable, neither the portfolio equilibrium condition nor the parallel balance of payments condition can be estimated directly. The case study authors generally handled this problem by using the portfolio equilibrium condition to eliminate the stock of foreign exchange from the balance of payments equation. Under rational expectations, this yields an equation for the parallel premium as a function of its own lagged value and expected future values of the other variables entering equations (2) and (3) -- including variables like the real money stock and the real official exchange rate that are potentially endogenous. Equation (4) gives a distributed-lag approximation to the (partly forward-looking) solution to (2) and (3):

$$(4) \ln z_t = \alpha \ln z_{t-1} + \beta(B)' W_t + \varepsilon_t.$$

where  $W_t = [e_t, (M_t/E_t), d_t^o, x_t^s, x_t^f]'$  is a vector of the theoretical determinants of  $Z$  (which enter both directly and as predictors of their own future values),  $\beta(L)$  is a vector of polynomials in the lag operator  $B$ , and  $\varepsilon$  is a white-noise disturbance.<sup>23</sup>

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<sup>23</sup> An alternative way of arriving at a version of (4) (cf. Elbadawi (1991) and Aron and Elbadawi (1991)) is to compute the steady-state solution to (2) and (3), assume that the parallel current account is balanced so that  $f_t$  is a constant, and use cointegration/error-correction methods to estimate a dynamic specification around the steady state.

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